The

Electrical Review

VOL. CVII. JULY 18, 1930. No. 2747.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

Chairman and Joint Managing Director: G. H. ALABASTER, COMPANION I.E.E.

Technical Editor: C. O. BRETTELLE, M.I.E.E.

Joint Managing Director: E. A. GATEHOUSE M.I.E.E., A.M.INST.C.E.

Commercial Editor: A. H. BRIDGE

Manager and Secretary: E. S. MIDDLETON.

OFFICE: 4, LUDGATE HILL, LONDON, E.C.4.

Telegraphic Address: "AGEEKAY, CENT, LONDON." Code, A B C. Telephone No.: Central 6871 (5 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades, and has by far the Largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d.; Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders on Chief Office, London) to be made payable to THE ELECTRICAL REVIEW, LIMITED, and crossed "Midland Bank, Newgate Street Branch."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

Contents:

	PAGE
The Commissioners	85
The I.E.E. Rules at West Ham	86
Belgium's Continued Prosperity	86
Next Year's Fair	86
The I.E.C. Meetings	86
The L.C.C. Tramways Report	86
A Battery Works Visit (*illus.*)	87
Copper-oxide Rectifiers, by C. W. Oatley (*illus.*)	90
Are Salesmen or Buyers to Blame?	92
Electricity for the Home (*illus.*)	93
Legal	95
Business and Industrial Notes	96
Lighting and Power Notes	101
Tramway and Railway Notes	103
Telegraph and Telephone Notes	103
Radio Notes	104
Contract Information	104
Notes	105
Our Personal Column	107
Financial Section—	
New Companies Registered	108
Official Returns of Electrical Companies	108
City Notes	109
Stocks and Shares	111
Wiring Rules at West Ham, by J. W. J. Townley	113
The World Power Conference (*illus.*)	114
Belgian Industry and Trade	116
Opportunities in Canada	117
The N.E.L.A. Convention	117
A New Oil Engine (*illus.*)	118
A New Radio-apparatus Factory (*illus.*)	119
Parliamentary News	120
The Royal Agricultural Show (*illus.*)	121
Correspondence—	
Interference with Radio Reception	122
Handy Electrical Appliances	122
Electrical Development: A Proposal	122
Published Specifications	123
New Work for Contractors	124

The Commissioners.

THE Electricity Commissioners have now prepared eight regional schemes for the Central Electricity Board, which cover almost the whole of Great Britain. It has been suggested in some quarters that in the completion of these schemes the work of the Commission is approaching its end. An answer to the implications of that view was, it will be recollected, given by Mr. W. W. LACKIE at the last I.M.E.A. dinner, when he declared that the work of the Commissioners was really only beginning. We do not think this statement is strictly apt to the situation, because the preparation of these technical schemes—important as the work may have been—was not the purpose for which the Commissioners were created and so formed no essential part of their duties.

It will be remembered that during the committee stage of the Bill which ultimately became the 1926 Act the procedure providing for the preparation by the Board of such schemes for the approval of the Commissioners was reversed. The original intention was that the Board should follow a course similar in principle to that adopted by companies operating under special Acts; this would have been a more logical arrangement, as the 1926 Act is, among other things, the special Act of the Board, which is in essence a regulated bulk supply company and not a Government undertaking.

The Electricity Commissioners, on the other hand, are Government officials. They were appointed under the 1919 Act for the purpose of promoting, regulating, and supervising the supply of electricity; their Parliamentary chief is the Minister of Transport, to whom they are advisers on all the technical matters transferred to the Minister from the Board of Trade—the authority responsible for electricity supply until 1919. By that time it was obvious—partly from war experience—that electricity supply had become far too large and important a part of the national life to be officially in charge of a minor section of a large Department. The examination of Bills and the granting of Orders now require far more attention than was necessary in pre-war times; it has been said that, owing to the additional work thrown on the Commissioners by the preparation of the schemes, there have been delays in Special Order procedure, while the recent speeding up of the publication

of statistics is probably in part to be attributed to the return to more normal conditions.

Supervision by men of experience in the finer points of electricity supply technique and economics is clearly required more than ever in connection with municipal loans, fringe orders, the operations of the Kitson clause, compensation for loss of employment and the other multitudinous and ever-growing duties left over from the earlier Acts. These duties will be amplified in future by reference to the Commissioners of matters arising out of the work of the Central Electricity Board—a large subject of which we cannot at the moment do more than make passing mention.

Then, again, there are developments in which the Commissioners will exercise their initiative, such as electrification in rural areas. We may also refer to the powers of the Commissioners in relation to supplies to small consumers. These include tariff questions, the standardisation of declared voltages (last discussed in our issue of April 25th, p. 762), and securing the safety of the public. In regard to the last, factories are adequately catered for by the Home Office Regulations, but there is little that can be done to ensure satisfactory installation work on other premises. The powers of supply authorities to require a minimum standard is generally limited to fulfilling the provisions of the Electricity Acts requiring that the leakage current shall not exceed a certain proportion of the whole output and that no consumer's installation shall affect the supply to other consumers. It is true that many undertakings interpret these provisions very liberally in the interests of their consumers, but it would be far more satisfactory if the position were regularised through the agency of the Electricity Commissioners.

There is, indeed, so much that the Commissioners can do without undue interference with local initiative that we must accept the spirit of Mr. LACKIE'S dictum, even while meticulously disputing its verbal accuracy.

The I.E.E. Rules at West Ham.

As we mentioned in our leading article last week, one problem with which the electrical installation contractor is faced is the securing of regulations of such a nature as will eliminate the "jerry" wireman but will not be oppressive to the reputable contractor. We pointed out that regulations entailed inspection, and referred to the fact that West Ham had secured powers to adopt the I.E.E. Wiring Regulations as bye-laws.

In this issue Mr. J. W. J. TOWNLEY, the borough electrical engineer of West Ham, says something of the results of this attempt to secure dependable installations, with particular reference to the methods of inspection.

Mr. WILLOUGHBY-ELLIS said at the Llandudno Conference that several municipal authorities were endeavouring to institute electrical bye-laws and that these powers had been granted, subject to the approval of the bye-laws by the Electricity Commissioners. We commend Mr. TOWNLEY'S article to the attention of our readers, for, whatever their opinions on the matter may be, they will realise that West Ham's experiences must almost inevitably be taken into account when other authorities' bye-laws are being considered by the Commissioners.

Belgium's Continued Prosperity.

WHILE practically the whole world is still suffering from the after-effects of the European war, the two countries which were the scene of the intensest phase of the conflict—France and Belgium—have not only recovered from their wounds but are actually in a prosperous condition.

The report of the British Commercial Secretary at Brussels, which we review in this issue, shows that Belgium has little or no unemployment and is actually considering bringing in labour from outside the country. The national Budget shows a surplus, and while imports have exceeded exports the balance is said to be redressed by invisible exports and revenue derived from abroad.

When reviewing previous reports from the Commercial Secretary at Brussels we have complained of the omission of all reference to the rather important Belgian electrical manufacturing industry and foreign electrical trade. This time, we are pleased to see, a page of the report is devoted to these subjects and mention is also made of them in other parts of the report. Although the details of the electrical imports and exports are not complete, they embody one interesting point, that is that in 1929 Great Britain's exports of dynamo-electric machinery to Belgium exceeded her imports from Belgium by a substantial amount. The weight of these exports was more than double that of 1928, but our share of the trade remained small as compared with the quantities supplied by Germany, France, Switzerland, and Sweden.

Mr. REYNTIENS gives reasons for the general advance of our export trade to Belgium. The first of these seems to be a considerable reduction in prices, but credit is also given to British manufacturers for the greater attention which they are paying to the market and its requirements.

There are indications that still more business can be obtained from Belgium, for we have as yet only reached fourth place in the list of general exporters to that country and fifth in the list of suppliers of electrical goods.

Next Year's Fair.

IT is comforting to learn that the Electrical Advisory Committee of the Birmingham Section of the British Industries Fair is not resting content with past achievement. Efforts are being made to effect improvements in a number of directions.

In the first place, in 1931, the Electrical Section is to be absolutely electrical; in previous years it has contained some rather inappropriate exhibits. We hope, too, that an endeavour will be made to classify and group the electrical exhibits, although we realise that there are difficulties in the way of doing this thoroughly; so many electrical manufacturers produce a variety of goods of widely-different character.

Official visits and conferences will again be arranged, and next year the Committee is making an effort to get overseas buyers of electrical goods to participate in these functions. This should lead to a closer contact between electrical exhibitors and the people whom they desire to interest in their products. There will again be an electric kitchen in operation and we hope that greater publicity will be given to it this time.

The I.E.C. Meetings.

SOME 300 delegates from 25 different countries (including 50 from Great Britain) attended the Scandinavian meetings of the International Electrotechnical Commission. The technical results achieved by the 19 committees which were in session for practically a whole week are regarded as satisfactory. Appreciable progress was made with the international vocabulary, the rating of electrical machinery, symbols, specifications for steam turbines and measuring instruments, and definition of expressions used in circuit-breaker operation. The organisation of the whole of the proceedings was excellent, and general recognition was accorded to the work of Mr. C. LE MAISTRE, general secretary of the I.E.C. (and also director of the B.E.S.A.).

We purpose dealing more fully with the meetings of the Commission in a subsequent issue.

The L.C.C. Tramways Report.

MAINLY on account of the heavy burden of debt service, road maintenance charges, and rates, the L.C.C. tramways have shown net deficiencies for several years past. Last year, however, they surmounted all these difficulties and recorded a net surplus of £128,804, the first since 1922-23, when the figure was £230,251.

We trust that this will dispel the idea that tramways as a means of passenger transport in large cities are obsolescent and a financial burden.

A Battery Works Visit.

Impressions of a tour of the recently-established "Britannia" and "Pertrix" battery works in Worcestershire, with observations on the up-to-date mechanisation of the manufacturing and assembly processes.

WHILST the controllable release of sub-atomic energy and the utilisation of that illimitable source in substitution for known methods of power production is the tantalising vision of most physicists, it is instructive to reflect that one method of setting free, or unbalancing, electrons was discovered 131 years ago, for in 1799 Alessandro Volta observed that when two metals, neither of which apparently had electrical properties by itself, were connected together and then separated, each would then exhibit signs of electronic displacement, one of the metals being more ready to part with electrons than the other. Moreover, by immersing the free ends of the conductors in a suitable electrolyte he provided a chemically-decomposable liquid passage for the transfer of electrons from the accumulating pole to the other, thus tending to restore equilibrium and so permit of the continuance of the stream across the metallic joint. Such a device for the disturbance of normal electronic distribution is termed a "voltaic cell," and it is not always realised that all modern "batteries" used to-day are merely improved variants of that simple apparatus.

Their diverse and innumerable applications maintain a healthy world demand for new batteries without apparent signs of diminution, since no more practical means of storing energy electrically has so far been devised. Hence, in order to enable it to cater for the market adequately, Britannia Batteries, Ltd., under the managing directorships of Mr. E. G. Lind, A.M.I.E.E., and Mr. E. Jacob, M.I.E.E., is now manufacturing at recently-established works in Worcestershire so-called "dry" primary non-reversible batteries

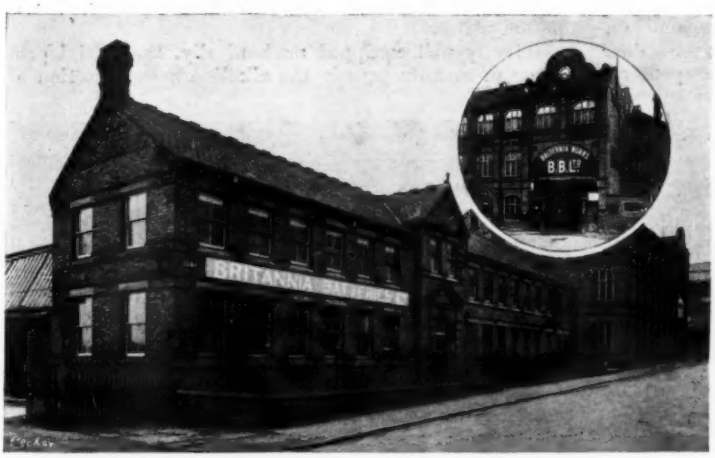


Fig. 1.—"Britannia" Battery Works, Redditch.

of the "Pertrix" non-salammoniac type as well as secondary accumulators of both a modified Planté lead-acid and the Edison alkaline iron/nickel-oxide types, made up in the familiar varieties of containers and in the usual wide range of sizes in commercial use in their respective spheres.

Whilst battery manufacturing processes are too well known to need elaboration, it should be observed that

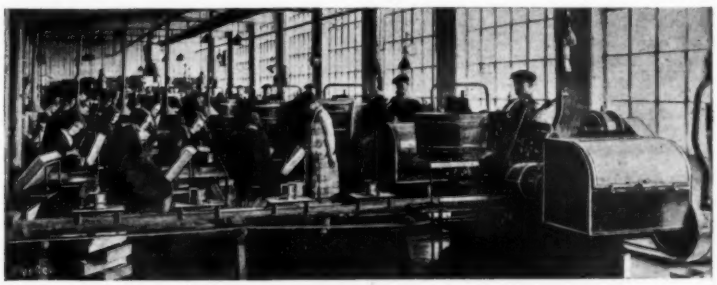


Fig. 2.—"Pertrix" Electrode Presses.

in adapting and re-equipping the B.S.A. small-arms and cycle factory at Redditch, Mr. R. A. Bachman (of ripe Edison, amongst other, American association) has been assisted by the active co-operation of the Accumulatoren Fabrik Aktien-Gesellschaft and the Deutsche Edison-Akkumulatoren G.m.b.H. In consequence full advantage has been taken of battery-propelled trucks, electric lifts, electrically-driven conveyors, gravity chutes, and moving assembly tables travelling at a speed of from 5 to 10 ft. per minute to reduce materially process manhandling, whilst the very extensive use made of automatic and semi-automatic power-driven machine-tools (of which most of the accompanying illustrations are evidence) would seem to provide liberally for quantity production at competitive costs.

For instance, gravity feeding is employed in grinding and mixing the dry battery ingredients, which are afterwards machine-pressed (fig. 2) into the requisite form of electrode; even the zinc canisters, carried on trays, are belt-fed to machines which fill each automatically with a measured quantity of electrolyte (fig. 3, centre), while automatic soldering machines (fig. 4) save considerable time. Each moving assembly table (fig. 5) is capable of dealing with as many as 150,000 cells per day, the assembled batteries being tested before sliding off the ends of the tables down chutes.

Usually one of the most unpleasant departments of lead-acid battery works, fig. 6 shows part of the plate formation control bay, it being indicative of the cleanliness and orderly tidiness evident throughout the Redditch works. The doors shown provide access to the batteries themselves, which are housed behind the brick wall to prevent acid fumes entering the shop. Similarly, dust from the lead mills is collected in filter bags to avoid its discharge into the atmosphere.

After being mixed in stages by machinery the paste is conveyed to the machines illustrated in fig. 7, each of which pastes two plates simultaneously on a moving rubber band; each machine is capable of pasting some 30,000 plates per day and by changing the band table each can deal with five sizes of plates.

Fig. 3.—Canister Filling Machine.

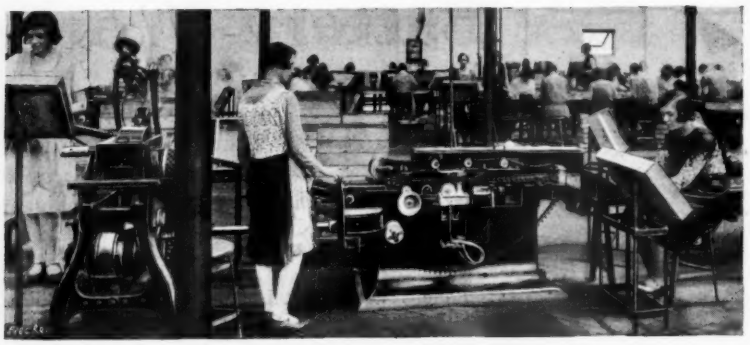


Fig. 4.—Automatic Soldering Machine.

One example of the modern machines installed in the lead plate-casting foundry is depicted in fig. 8; a central melting pot feeds compressed-air equipment on either side which ejects the molten metal into the moulds, thus abolishing the usual hand ladling and pouring operations. Another single machine represents still more up-to-date design. From the melting pot at the extreme end, lead is extruded in ribbon shape, wound on to a water-cooled drum, and then punched into grid form, the scrap metal being returned by conveyor to the melting pot. Still in the ribbon form, the grids are pasted, gently squeezed between paper, which absorbs the moisture, and then cut up and numbered before being finally acid treated. The mechanical processes produce good clean grids and well-formed plates capable of an equal number of charge-discharge cycles as hand-pasted plates.

Fig. 5.—Moving Assembly Table.

Fig. 6.—Lead-acid Plate Formation Controls.

Equally well equipped mechanically, the initial processes of manufacture in the alkaline battery section of the factory are of course more electro-chemical in nature. For instance, nickel flake, one of the active materials used, is produced by the electrodeposition of copper and

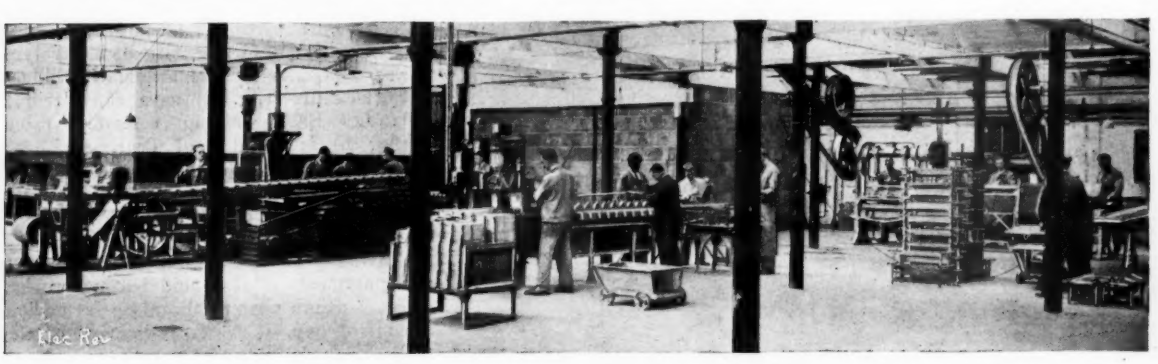


Fig. 7.—Lead-acid Battery Plate Pasting Machines.

nickel in alternate layers, the sheet thus built up being cut into small squares and the copper content then dissolved out, the residual nickel flake being recovered by floatation. Figs. 9 to 11 are illustrative of machine tools with the aid of which metal ribbon is trimmed, perforated, burr ground, and brushed off prior to being annealed in a neutral atmosphere in an improved (provisionally-patented) furnace of Mr. Bachman's recent design. It is then formed into pockets and drawn into tubes into which the active materials are respectively pressed and packed by tamping machines (fig. 10 foreground); next assembled in grids and packed in alkaloid electrolyte containers, which are nickel-plated inside and out (fig. 12) all-welded and tested for leakage under water with compressed air.

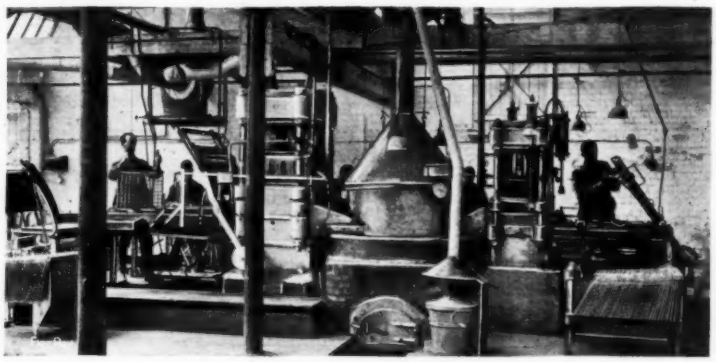


Fig. 8.—Compressed-air Grid Casting Machine.

Apart from the electric light and power services, the varied voltage and current requirements of the electro-deposition departments and the several plate-forming sections of the works are catered for by a motor-generator sub-station, auxiliary applications including wax (fig. 2) and compound heating, &c. Tool-makers', millwrights' and wood-working shops, stores, and dispatch sections are all adequately equipped, while separate chemical, physical, and electrical laboratories constantly check materials and performance.

Ample washing facilities for the 658 employés (May, 1930), which are so necessary in works of this kind, are available (even a laundry being kept busy cleaning workers' overalls) together with clothes lockers and canteen accommodation; while first-aid rooms containing beds and stocked with surgical appliances and medical requisites, in charge of a trained nurse, provide for prompt attention in the event of accident casualties.

Indeed, the foregoing impressions of a tour of the factory, though admittedly somewhat cursory, should nevertheless suffice in conjunction with the selection of photographs reproduced above to afford some indication of the thoroughness of the endeavour that has been made so to lay-out and equip the factory that each process may be accomplished with celerity and economy of both labour and expense, whilst the establishment of the new works incidentally, but none the less worthy of approbation in the present situation of the labour market, provides welcomely remunerative employment for a considerable number of the skilled male and semi-skilled female populations of the locality.

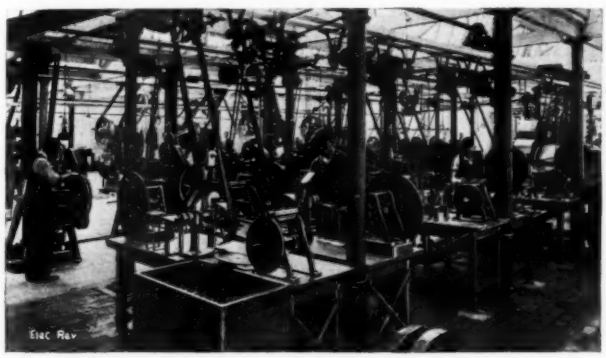


Fig. 9.—Band Presses and Perforating Plant.

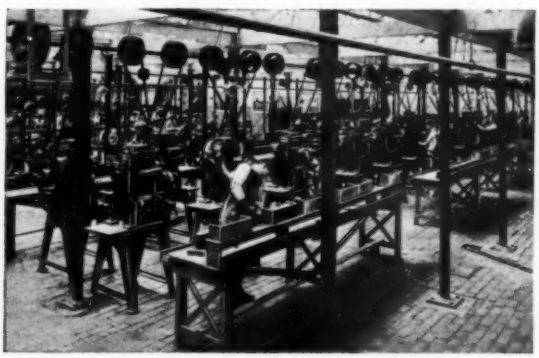


Fig. 10.—Nickel-iron Battery Assembly Shop.

The battery is probably the most abused component of any electrical equipment of which it forms a part, in most cases due to ignorance of, or failure to observe, the few simple rules requisite for efficient service and long life. In anticipation of such treatment, which is by no means uncommon, Britannia Batteries, Ltd., is not offering new or untried products; over 40 years' manufacturing experience is at its disposal, and the conscientious workmanship put into the making of all three types of batteries cannot fail to impress even the casual visitor to the Company's large modern factory near Birmingham.

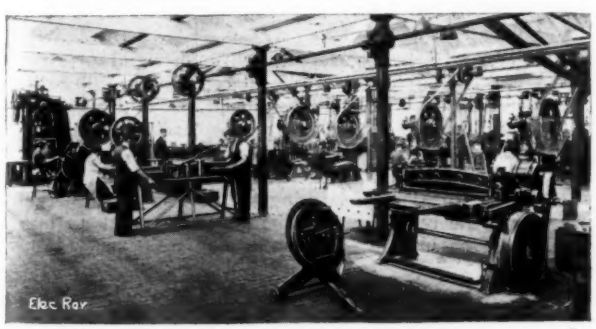


Fig. 11.—Cadmium Grid Press Shop.

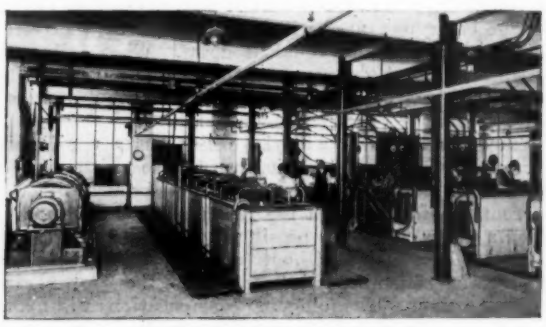


Fig. 12.—Nickel-plating Department.

Copper-oxide Rectifiers.

Some Notes on their Use in the Construction of Alternating-current Measuring Instruments.

By C. W. OATLEY, B.A.

AN article* already published outlined the general principles underlying the use of copper-oxide rectifiers in the construction of alternating-current measuring instruments. The experiments described below were carried out some months ago and they illustrate certain points which are not mentioned in the former article.

For the purpose of the tests a rectifier was built in the following manner: a Westinghouse type A.3 rectifier, suitable for use in radio-telephone receiver low-voltage battery eliminators, was dismantled and four elements with their accompanying lead washers and brass cooling fins were re-assembled on a bolt about one inch in length, the connections being as shown in fig. 1. The unit so formed provides full-wave rectification, which is obviously necessary in the case of current-measuring instruments, which have to be connected directly in the circuit wherein the unknown current is flowing, but it might be thought that half-wave rectification would be sufficient in the case of voltmeters, which are connected across the main circuit. That idea is not correct, however, for during the half cycle when no current flows the whole of the voltage being measured will be applied across the rectifier and will probably break it down. When full-wave rectification is employed current flows during each half-cycle, and the greater part of the total voltage drop takes place across the voltmeter series resistance.

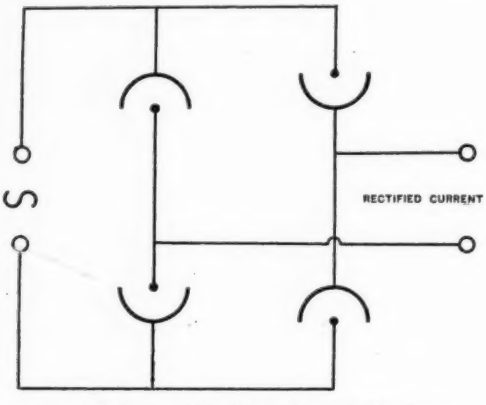


Fig. 1.—Rectifier Circuit Diagram.

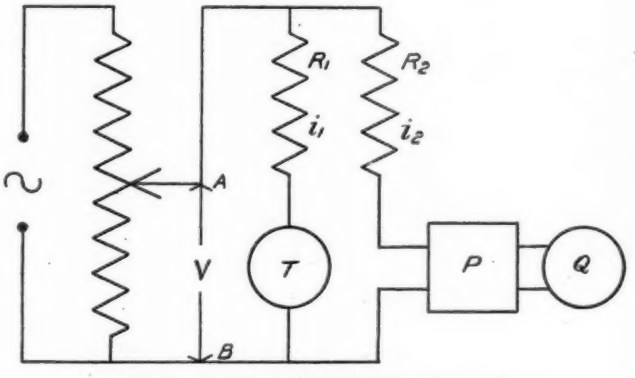


Fig. 2.—Experimental Circuit Diagram.

Since a rectifier is a device which has a non-linear current-voltage characteristic, the effective resistance of a rectifier milliammeter, for example, will vary with the current passing through the instrument; furthermore, when a given current is passing through the instrument it cannot be assumed without further investigation that the effective resistance is independent of the external circuit conditions. The following considerations will make this clear. Suppose that a rectifier milliameter is connected to a low-resistance source of small alternating potential of sinusoidal wave-form. Then, since the resistance of the rectifier comprises the greater part of the total resistance of the circuit, the current wave-form will be determined by the shape of the rectifier characteristic and will not, in general, be sinusoidal. Consider, next, the same rectifier milliammeter to be connected in series with a high-resistance and source of sinusoidal voltage, such that the current registered by the meter is the same as before. In the latter case the series resistance will comprise the greater part of the total resistance of the circuit and the current wave-form will be very nearly sinusoidal. Thus, although the meter registers the same current in the two cases, the current wave-form is not the same and the effective resistance of the meter will not necessarily be the same either.

To obtain further information on this point the following experiment was carried out. A circuit was set up as indicated in fig. 2; T is a thermo-junction milliammeter and R_1 and R_2 are known non-inductive resistances; a rectifier milliameter consisting of a full-wave rectifier P and a d.c. milliammeter Q, which has a resistance of 2.1 ohms, gives full-scale deflection with 15 milliamperes. Let r be the effective resistance of the rectifier meter considered as a whole; then, if V is the voltage between the points A B in fig. 2

$$V = R_1 i_1 = (R_2 + r)\ i_2 \quad \ldots\ldots(1)$$

where i_1 and i_2 are the currents through T and P, respectively. The current i_1 was kept constant at 100 milliamperes throughout the experiment, so that $V = 0.1 R_1$. This combination of thermo-ammeter and resistance was used to measure voltage in this and the following experiments because other suitable voltmeters were not available. The method of keeping the current constant and varying the resistance has the advantage that an open part of the uneven thermo-ammeter scale may always be used.

The d.c. measured by the meter Q was kept constant at 10 mA and the object of the experiment was to determine whether r has a definite effective value, which remains constant and independent of the external circuit so long as the d.c. through Q remains constant. If such is not the case, then equation (1) has very little meaning. If, however, r has a definite value, it may be assumed that the rectifier is not causing any very great distortion

* By E. H. W. Banner, see ELEC. REV., May 10th, 1929.

of the current wave-form of i_2, and in consequence, since the d.c. through Q is kept constant, it may be assumed that i_2 remains constant. Thus

$$i_2 = \text{constant} = v/(R_2 + r) = 0.1R_1/(R_2 + r) \quad \ldots\ldots(2)$$

If, therefore, we plot v against R_2 and if r does remain constant, the resulting curve will be a straight line cutting the axis of R_2 at a value equal to $-r$.

A curve of some results obtained in this way is shown in fig. 3 from which it will be seen that the points lie

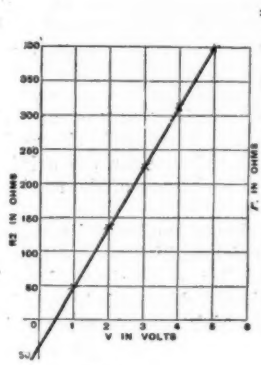


Fig. 3.

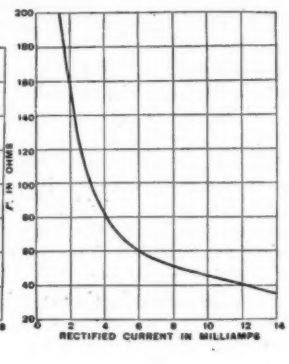


Fig. 4.

sufficiently well on a straight line to justify the assumption that, when the d.c. through Q is kept constant at 10 A the rectifier meter has a definite effective resistance of 42 ohms. It should be borne in mind, however, that the current-voltage characteristic of a copper oxide rectifier has its greatest curvature near the origin and it would be expected therefore that the rectifier would cause greatest distortion of current wave-form when very small currents were passing through it. Consequently, it is possible that the effective resistance of a rectifier meter may depend to some extent on the external circuit when only small currents are passing. This point has not been tested experimentally, but it is assumed that r is independent of external circuit conditions for all values of current used in the following experiments.

By a slight modification of the above experiment it is possible to determine the manner in which the resistance of the rectifier meter varies with the rectified current through Q. Using such apparatus as is indicated in fig. 2, v is kept constant at some convenient voltage and R_2 is adjusted to give successively a series of values of rectified current. The voltage v is then doubled and the values of R_2 (say R'_2) which give the same values of rectified current as before are noted. Then it may be assumed that, if the rectified current is the same for any two values of R_2 and R'_2, the alternating current i_2 will also be the same for those two values. Thus

$$i^2 = v/(R_2 + r) = 2v/(R'_2 + r) \quad \ldots\ldots(3)$$

Therefore

$$r = R'_2 - 2R_2 \quad \ldots\ldots(4)$$

Furthermore, when r has been found from (4) its value may be substituted in (3) and i_2 can then be calculated. This method of calibrating a rectifier milliammeter is particularly useful for low ranges when standard a.c. milliammeters are not usually available.

TABLE 1.

First value of v = 2 volts; second value of v = 4 volts.

Rectified Current in Milliamps.	R_2 ohms.	R'_2 ohms.	r ohms.	Alternating Current i_2 in Milliamps.
1 ...	1,400 ...	3,000 ...	200 ...	1.25
2 ...	700 ...	1,580 ...	180 ...	2.27
4 ...	350 ...	780 ...	80 ...	4.65
6 ...	230 ...	520 ...	60 ...	6.90
8 ...	169 ...	391 ...	53 ...	9.02
10 ...	134 ...	313 ...	45 ...	11.15
12 ...	110 ...	260 ...	40 ...	13.33
14 ...	93 ...	220 ...	34 ...	15.73
235 ...	4 ...	12 ...	4 ...	—

The results of an experiment carried out as described above are tabulated in Table 1.

The resistance of the d.c. milliammeter used in making the last observation was only a small fraction of one ohm, while that of the one used in making the other observations was 2.1 ohms. The curve representing r plotted against rectified current is shown in fig. 4. It should be noticed that the method is not likely to be very accurate in the case of small values of rectified current, since r is then determined as the difference of two very much larger resistances.

As a matter of interest, the effective resistance of the rectifier milliammeter used for the above-outlined tests was also determined by placing it in one arm of a Wheatstone bridge adapted for use with alternating current, the balance point being determined with telephones. By variation of the ratio arms the rectified current in the rectifier milliammeter could be adjusted to any desired value, and the effective resistance of the meter at that value then measured. This procedure was carried out with two different rectifiers connected in turn to the d.c. milliammeter; the values of r_1 and r_2 are shown below (Table 2).

TABLE 2.

Rectified Current in A.	r_1 in ohms.	r_2 in ohms.
1 ...	190 ...	190
2 ...	116 ...	120
4 ...	73 ...	73
6 ...	54 ...	54
8 ...	44 ...	44
10 ...	37 ...	37
12 ...	32 ...	32
14 ...	29 ...	29
300 ...	3 ...	3

It will be noticed that the two values of r given by the two different rectifiers are almost identical, which may, of course, be fortuitous; definite conclusions cannot be drawn without the examination of many more rectifiers. Furthermore, the values of r obtained by this method are in all cases lower than those obtained by the previous method, which fact may probably be explained as follows. The introduction of the rectifier into a bridge network produces harmonics of the alternating current and it is not possible to balance them out by adjustment of the other arms of the bridge. The resistance of the rectifier meter as measured by balancing out the fundamental component of the current, though a perfectly definite quantity, is not necessarily the same as the quantity measured by the first method. The

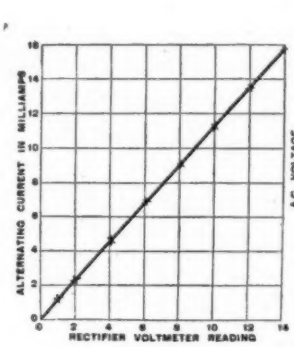


Fig. 5.

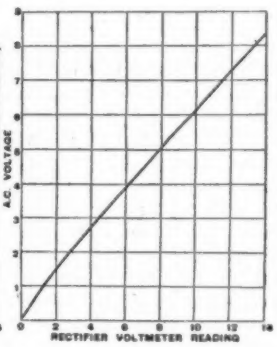


Fig. 6.

experimental difference here obtained emphasises the need for care in stating exactly what is meant by effective resistance. It may be noticed that the difference between the two values of r found by the two different methods becomes greater as the current decreases. This is in accordance with the fact that the static characteristic of the rectifier has a greatest curvature for small values of current and therefore will introduce the largest proportion of harmonics with respect to the fundamental at small values of current.

The values given in the last column of Table 1 were obtained, as explained above, by substitution of the values of r in equation (3). In fig. 5 these values of alternating current are plotted against the corresponding readings of the rectifier milliammeter, thus producing the calibration curve of the instrument. It will be seen that, within the limits of experimental error, the "curve" is a straight line. This linearity is, of course, advantageous in that it gives an open scale to the instrument, but it should be remembered that, on account of it, an instrument calibrated to read r.m.s. values will not be independent of wave form. The readings of the instrument will, in fact, be proportional to the mean values of the current and consequently r.m.s. values can be calculated, if the form factor of the current is known, and if the external circuit is such that the flow of current through the meter is not appreciably modified by the variation of the meter resistance with current. To increase the range of a rectifier milliammeter one may either shunt the instrument as a whole, or else shunt only the d.c. meter. The first method has the disadvantage that, owing to the variation of the resistance of the rectifier with current, the shunted instrument will no longer have a linear scale. This difficulty is overcome by the second method, which, however, is limited in application to currents which do not exceed the rated capacity of the rectifier. The range may also be increased by the use of a current transformer.

When it is desired to convert a rectifier milliammeter into a voltmeter by the addition of a resistance, it would appear at first sight that the resistance might be connected either in series with the instrument as a whole, or in series with the d.c. meter. The alternative, which is equivalent to the addition of a rectifier to a d.c. voltmeter, cannot in general be used, since practically the full voltage applied to the instrument would be acting in the reverse direction across those rectifier elements which, at any instant, are not carrying the current and, except in the case of very low-range instruments, those elements would probably break down. When the resistance is connected in series with the instrument as a whole this difficulty does not arise. A calibration "curve" of an instrument connected in this manner is shown in fig. 6; it is linear, except for points near the origin, where the large increase in the resistance of the rectifier begins to be appreciable.

It is hoped that the foregoing remarks will serve to point out some of the precautions which are necessary when using rectifier meters. When correctly used, such meters appear to be thoroughly reliable, and they enable one to make measurements which cannot readily be carried out by other means.

Are Salesmen or Buyers to Blame?

The author suggests that the salesman's task would be rendered easier if buyers were more reasonable.

By I. S. A.

IN these days when everybody is shouting about poor salesmanship generally, and the daily Press gaily broadcasts our supposed shortcomings to our foreign rivals, it is not inopportune to look at the matter from the salesman's point of view, and to endeavour to visualise some of his difficulties.

It is said that a good salesman is born, not made, and when an accredited good salesman fails to keep up his figures, surely the matter is one for serious investigation. Some salesmen estimate that one-third of their time is wasted by inefficient buying departments, and, without doubt in the case of a large proportion of inquiries that are often "broadcast," it is nothing more than a sheer waste of time to follow them up, but more of this later.

Some buyers will not rouse themselves to see what is doing in the way of new ideas, and it is useless to say that these new ideas will come to the surface in time, because poor reports from salesmen will probably mean many new ideas being abandoned for want of justification. It is not an uncommon sight to see a queue of salesmen waiting for an interview, and then not getting a chance at all to state their business. Some buyers have their favourite suppliers, and though they see other representatives they have no intention of giving their firms a chance to secure business. In many business houses crude notices are exhibited in the region of the buying offices such as: "Travellers seen by appointment only," "Salesmen seen only between 10 and 12 on Mondays," &c. I wonder how the employers of such devices imagine that any salesman can profitably plan a round of calls; it is certainly impossible if he is a newcomer to the district.

We all know that no buyer can hope to see everything or be expected to interview all comers, but that is a much different thing from a cursory dismissal after a mere glance at a salesman's card. Salesmen are often told that persistence will win in the end. This is not always so; in many cases it means that in future a salesman's card gets no further than the office boy, and unless the salesman has unlimited time to waste in order to chance a meeting with the buyer, whom he may not know, another day is wasted.

A great deal of time, too, is wasted in following up tenders submitted in response to a "broadcast" inquiry. In time, no doubt, a salesman can tell what chance he has of securing an order from a particular purchaser, but can he, in these days of severe competition, afford to ignore the purchaser completely? Probably his head office knows nothing about the methods of that particular buyer, and would not accept his excuse for not calling. Then, again, there is the questionable practice of "Dutch auction" still practised by buyers who think they are smart. One salesman (A) calls, is told that his price is approximately 5 per cent. too high, and he may be authorised (if he is lucky) to come down that 5 per cent., when he is told, "I will let you know in a day or so." Another traveller calls, and he is told that *his* price is 5 per cent. higher than "A's" revised figure, and so it goes on. The writer has had personal experience of this practice; there is only one cure for it, a standard fixed price throughout the particular trade. Again, it is by no means unknown for a buyer to invite a foreign tender in order to beat down a British firm; what chance for salesmanship is there against such practices?

Whilst we may have our shortcomings as a nation of salesmen at home and abroad, one is apt to ignore the shortcomings of the buyer. The best salesman going, or the most efficient sales organisation possible, will not get over the human element, as briefly outlined above. This article is written from practical experience, and is meant simply to draw attention to some of the difficulties with which a salesman has to contend in these days of highly competitive business and a restricted market.

Electricity for the Home.

An account of what has been, and is being, done by the North Metropolitan Electric Power Supply Company to encourage the sale of electricity for domestic purposes.

(*Concluded from page* 56.)

With regard to showrooms, the policy of " Northmet " is for each local undertaking to have its own premises so soon as it is sufficiently large to warrant their establishment. The number of showrooms is therefore steadily increasing as new districts are added from time to time and the older districts increase in size and importance. The earlier buildings were all on leasehold property, but for some time past any new showroom opened has been built on freehold property to the Company's own design.

The first showroom was in the nature of an experiment and was opened at Edmonton in 1911, since which date others have been built at varying intervals at Barnet, Tottenham, Enfield, Wembley, St. Albans, Hertford, Southgate, Chingford, Edgware, Harpenden, Elstree, Hoddesdon, Royston, and Buntingford. Examples of urban and rural showrooms are given in figs. 5 and 6, respectively. The showrooms vary in size, according to the importance of the undertaking, and as a district develops a larger showroom is built when occasion warrants.

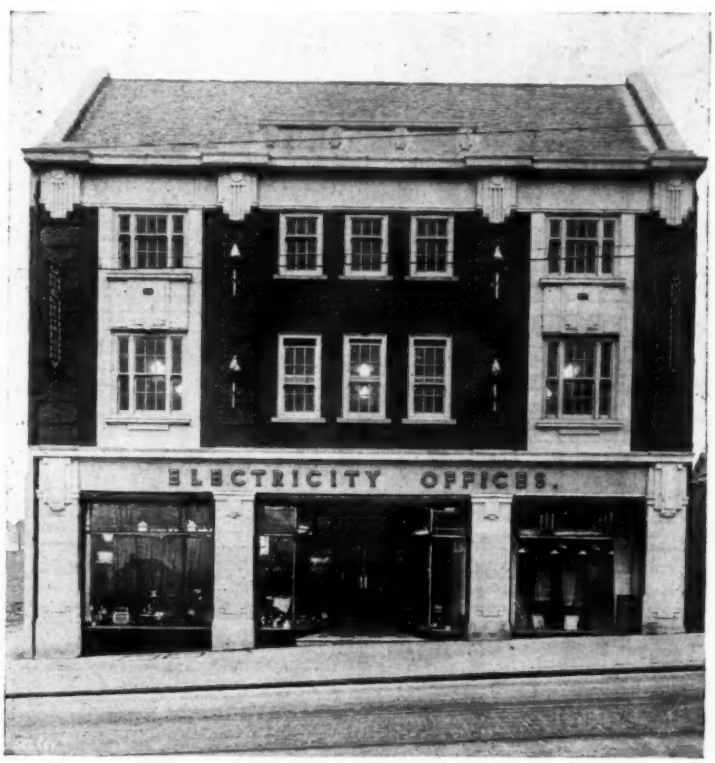


Fig. 5.—The Barnet Showrooms.

The showroom windows are designed with ample dressing space, and permanent wiring is arranged for sufficient lighting points above the windows and in the ceiling, while there is an adequate number of " outlets " beneath the windows. Screens are provided on which suitable backgrounds can be readily fixed. The window displays are changed, as a rule, every two weeks. In the majority of showrooms there are two windows; one of these may be described as a vista window, in which there is a general display of fittings, appliances, &c., and through which the interior of the showroom can also be seen, while the other is used for some special feature, such as the display of some particular electrical device or piece of apparatus, or a special line of goods manufactured by some electrical Company. Occasionally the special window is dressed by one of the undertaking's consumers with the latter's own goods, such as millinery, footwear, or groceries, in order to demonstrate the advantages of up-to-date methods of illumination. It is usually found that this practice leads directly to several orders being given for modern installations, not only by the firm whose goods have been displayed, but also by other stores in the locality amongst whom rivalry has been created thereby.

The interior of each showroom is designed to convey a sense of comfort and attractiveness, and at the same time to afford ample facilities for the display of apparatus, fittings and shades, as wide a selection as possible being carried to suit all tastes and all purses. The more delicate goods, such as vellum and silk shades, are shown in glass-fronted showcases, the tops of which form shelves on which are displayed portable lamps and light apparatus. These shelves are permanently wired, so that the various fittings and devices can be demonstrated at any instant. A special feature of the showroom interior is that every fitting or device displayed can be readily shown in use or operation.

It is the practice in most of the showrooms to reserve a space for an electric kitchen, which is fitted up with a cooker, hot-water apparatus, sink, and a kitchen cabinet. The kitchen is usually not readily visible from the main window, so that demonstrations can be given without the visitors being in full view of passers by. The number of demonstrations given depends on the requirements of the various undertakings; in some of the larger ones they are given regularly once a week, and in the smaller ones once a month. When special campaigns are being conducted cooking demonstrations are given frequently, perhaps every day. Great importance is attached to the necessity of presenting electric cooking as a simple process, without labouring the " new method idea." A floating staff of two demonstrators attached to headquarters visits the local showrooms at various times to assist in the demonstration work and to dress the windows. The

other types of heavier apparatus, such as washing machines, water-heaters, refrigerators, &c., are also displayed in some space which is visible from the main showroom, and large enough to allow of demonstrations being given without the usual work of the showroom being interrupted.

Fig. 6.—" Northmet " Display at Hertfordshire Show.

The showroom staff consists of girls who are specially trained to deal with the sale of small apparatus, minor repair items, &c. In the larger undertakings one of the staff demonstrates cookers and the heavier apparatus, both at the showroom and in the home. One of the showroom staff also acts as a cashier, it being found a great convenience to consumers to be able to pay accounts at the showroom. The sales offices are situated at the back of the building, and they form the headquarters of the various sales engineers who are employed in obtaining orders for power and lighting installations, appliances, and other apparatus. Access is given from the sales offices to the wiring stores and maintenance department, which are at the back of the premises, material being delivered and taken out without being passed through the front of the building. The offices of the resident engineer, assistant engineer, and clerical staff are situated on the first floor. An interesting feature of the standard equipment is a small electric lift which serves the showroom and the offices above; when the showroom attendant receives cash from a consumer she sends it upstairs, in the lift, to be dealt with, leaving her at liberty to give her whole attention to the client. Another practice designed to help to show that the undertaking is very much alive is to stock at each showroom a few cigarettes which visitors are invited to try. These are made up in boxes of 100, both cigarettes and boxes carrying the Company's name. A few boxes are sent out at Christmas, each with a suitable card inside. " Northmet " displays regularly every year at two important exhibitions, the North London General Trades Exhibition at Alexandra Palace, and the Hertfordshire Agricultural Show, in addition to a number of smaller local exhibitions as occasion arises. At the North London exhibition the undertaking uses its own stand, which it takes to exhibitions and erects when required. With the exception of the display by United Dairies, Ltd., " Northmet " prides itself on having the best show in the exhibition, fig. 9. Good business was done last year in domestic apparatus, of which the display was practically wholly composed, and quite a number of electric washing machines were sold. At the Hertfordshire Show the " Northmet " display, fig. 6, is claimed to be the only one of its kind. The object of the display is two-fold; it depicts the use of electricity on the farm and in the home. For the electricity supply to the stand an overhead line is erected right up to the point of usage, with the object of allowing farmers to see how a line can be erected inexpensively. An interesting observation of the Company is the different attitude of the public now-

Fig. 7.—Display Windows at Harpenden.

Fig. 8.—Demonstration House at Potters Bar.

adays to what it was, say, ten years ago. People visit exhibitions now to " find out " and also to buy. Figs. 8 and 10 depict further efforts on the part of the Company to popularise the use of electricity. Fig. 8 is a view of a demonstration house at Potters Bar and fig. 10

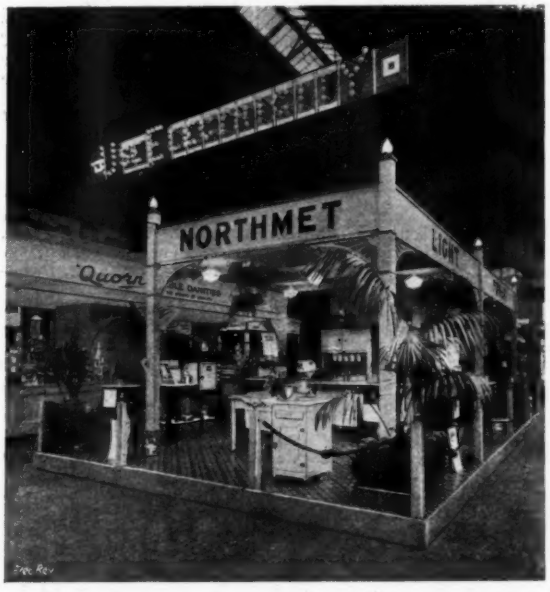


Fig. 9.—Stand at North London Exhibition.

shows a demonstration lorry used at Hertford on the occasion of a fête in aid of Sir William Treloar's fund for cripple children.

The organisation does not hire out domestic appliances, but it does all that is possible to foster hire-purchase. Last year 3,000 agreements were entered into for the hire-purchase of installations and apparatus, having a total value of over £50,000. For the previous year a total of about £23,000 involved some 2,000 agreements. The hire-purchase terms are very simple indeed, and are laid out equally simply in the small booklet " Electricity and Ease " to which reference has already been made. Electric cooking is " pushed " very strongly, and there are now over 2,000 cookers out on the mains (all direct sales or hire-purchase). The demand is steadily growing, and this year the sale of cookers during the first quarter was twice as great as that for the corresponding quarter of last year; there are practically no " returns." Maintenance is found to be

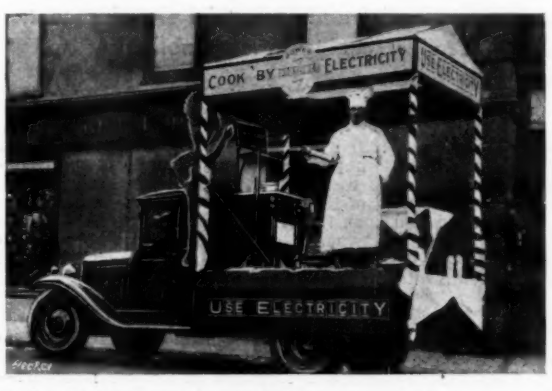


Fig. 10.—A Demonstration Lorry.

not an expensive item, and both the undertaking and consumers are encouraged by the two years' guarantee of the manufacturer of the hot plates.

With regard to the water-heating load, a large business is done in fitting immersion heaters into existing tanks. The Company believes there is a big load to come from electrical refrigeration, and this summer, with the co-operation of manufacturers, campaigns are to be conducted throughout all the districts. " Northmet " is always after the speculative builder to get him to put in at least one cooking point in each house. The service cable laid into each house is always large enough to provide for a cooking supply.

We are indebted to Mr. Evelyn Boys, the secretary, and to Mr. Drew, consumers' engineer, for their assistance in the collection of the foregoing information.

Legal.

Strombo Electric Co., Ltd., v. Bell.

IN the Shoreditch County Court, on July 10th, before Judge Cluer, the Strombo Electric Co., Ltd., Clerkenwell, sued H. Bell, trading as the Bell Electric Lamp Co., Banner Street, E.C., to recover £28 16s. for four gross of " Strombo " holders supplied on April 3rd last. The defence was that there was an implied warranty that they were fit for the purpose for which they were manufactured, free from faults and defects. The holders were made of metal for holding electric lamps which could be made up into signs and devices outside shops and kinemas, being attached to lengths of cable. The material, however, was not, it was alleged, capable of resisting the heat; the bulk of the holders had been sold, and customers were making claims against the defendants or demanding to be supplied with new electric light strips. They valued the holders at 6d. only, and claimed for the cost of replacing four gross at 6d., £14 8s., and the cost of replacing six gross which had been previously supplied at 6d., £21 12s. They further claimed the amount which they had paid to the plaintiffs, £37 18s., a total of £73 18s., and a 10 per cent. discount on the amount claimed by the plaintiffs.

Counsel for the plaintiffs said that his clients had received a letter from the defendants suggesting that they had been supplied with some faulty holders, and asking for a gross to replace them. Plaintiffs wrote asking them to send the faulty ones back, but they had not received one faulty holder back.

Mr. ARRIGONI, a director of the plaintiff company, said that his company had a provisional patent for the holders, which were sold loose to fasten on strips with standard size lamps. They had sold many thousands of them without a single complaint. When they were asked by the defendants for a gross to replace faulty ones, they demanded to see the faulty ones before they offered to replace anything, and they were forced to take proceedings owing to the unreasonable attitude of the defendants. In cross-examination, the witness said that there were three other directors of the company, Messrs. Howard, Goodwin, and Jones, all of whom had dealt personally with the defendants, while he had not. He added that the company was registered on April 4th.

Judge CLUER immediately said that the limited company could not sue, as obviously the defendants' dealings had been with Strombo, before it became a limited company. Mr. Kyffin said he thought he could prove the assignment, but his Honour said there was no question of proving anything. Notice of assignment would have to be sent to the defendants, and as that had not been done, the limited company could not sue. The case would have to be struck out and would have to be begun again. Each side would be allowed its costs.

Enterprise Manufacturing Co., Ltd.

IN the Chancery Division last week Mr. Justice Bennett had before him a petition by the Mullard Wireless Service Co., Ltd., for a winding up order against the Enterprise Manufacturing Co., Ltd.

Mr. STABLE, for the petitioners, said that their claim was for £692. The petition was opposed by a large number of creditors and it had stood over for the reason that an offer of £1,200 had been made for the goodwill and certain other assets of the company. The majority of the creditors seemed to think that the offer was an advantageous one, and the petitioning creditors took the same view. The goodwill had now been sold for £1,200, which was about sufficient to pay off the debentures of the company. The position now was that the company had sold its goodwill, &c., but no one was left to get in the book debts, and the other assets and distribute them among the unsecured creditors.

Mr. TURNER, for the company, said the majority of the creditors were in favour of the sale of the goodwill and it was assumed that the company would be wound up volun-

tarily. All the assets except the book debts had been sold. The committee of creditors had previously opposed a compulsory winding up.

Counsel for the committee of creditors said they were in disagreement. The majority were in favour of a compulsory winding up.

The purchaser of the goodwill said that there was a tacit understanding that there should be a voluntary liquidation. He thought the goodwill would be damaged by a compulsory liquidation.

Mr. TURNER suggested that the petition should stand over for a week in order that the views of the creditors might be ascertained.

His Lordship directed the petition to stand over for a week, saying that it would be unfair to the purchaser if the business was to be damaged by a winding up order.

The petition again came before the Court on July 14th, when Mr. Stable said that an agreement had been come to under which they would ask for the dismissal of the petition. The Enterprise Company would pay the petitioners' costs and undertook to go into voluntary liquidation within 14 days.

Counsel for the Enterprise Company assented and Mr. Justice Bennett accordingly dismissed the petition on the agreed terms.

Mullard Radio Valve Co., Ltd., v. London Radio Co. (Leeds), Ltd.

IN the Chancery Division before Mr. Justice Eve recently Mr. CORSELLIS mentioned this case, stating that the plaintiff company had a motion for an injunction to restrain infringement of patents relating to various forms of radio valves. Defendants had agreed to treat the motion as the trial of the action to consent to a perpetual injunction and to pay £5 as damages and £10 towards the costs. The infringing valves had been bought by the defendants from importers against two of whom the plaintiffs had brought actions.

Counsel for defendants assented and Mr. Justice Eve made an order in the terms agreed to.

Truphonic Radio, Ltd.

IN the High Court on Monday last this company applied itself for a compulsory winding-up order. The company's Counsel said that it owed the bank £11,000 and a receiver had been appointed by a debenture holder. The former managing director of the company (Dr. G. E. Spero) appeared to be liable for a considerable amount; judgment had already been obtained for £10,000. It was therefore in the company's interest that it should be compulsorily wound up.

His Lordship made the usual Order.

British Thomson-Houston Litigation.

IN the Chancery Division on July 8th Mr. Justice Eve had before him a motion on behalf of the British Thomson-Houston Co., Ltd., for judgment in its action against the Midland Electric Lamp Co.

Mr. TOOKEY, for the plaintiffs, said that the motion was on the ground of default of appearance and defence. The action was for infringement of plaintiffs' patent relating to gasfilled lamps. An injunction had already been granted against the company and the plaintiffs might have issued a writ of sequestration, but they thought it better to bring another action joining a director who actively took part in the sale complained of.

His Lordship said that the injunction would now go against both defendants.

Moreton v. Robertson's, Ltd.

IN the Official Referees' Court of the High Courts last week Sir Wm. Hansell, K.C., heard an action which had been referred to him from the King's Bench Division, in which Mr. J. M. Smith Moreton, Pickenham Hall, Swaffham, Norfolk, claimed damages from Roberson's, Ltd., electrical contractors, Knightsbridge. The plaintiff alleged a breach of contract and negligence in respect of certain electrical work done by the defendants at his residence.

Mr. CYRIL ATKINSON, K.C., for the plaintiff, stated that the original installation at the Hali was put in in or about 1903. The defendants entered into an oral contract with the plaintiff in April, 1925, to make an examination of the old system and advise the plaintiff as to its serviceability and fitness for adaptation to modern conditions, and further to make the necessary modifications.

Defendants' case was that they executed certain electrical work with skill and care, and they said that they were not liable for any claim against them. They also counterclaimed for a sum of £90 for work done and material supplied.

Evidence was given for the plaintiff that the defendants agreed in 1925 to adapt to modern requirements an old system installed in 1903. On the completion of the work £510 was paid, but it was then found that the work had been so badly done that a total of £1,088 had to be spent in putting it right. The complaint against the defendants was largely in respect of wiring.

After considerable evidence had been given, the case unexpectedly concluded. After a consultation at the close of the plaintiff's case, the parties arrived at a settlement, with the result that the counterclaim by the defendants was withdrawn, and judgment was entered by the Official Referee for the plaintiff for £725 with costs.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures.

The British Industries Fair.

The Advisory Committee for the Birmingham Electrical Section of the British Industries Fair, 1931, held its first meeting last week. Mr. T. R. Martin and Mr. E. J. Jennings were invited to continue to act as chairman and honorary secretary respectively. It was reported that 24,000 sq. ft. out of 28,000 sq. ft. available for exhibitors in the Electrical Section had already been taken up. Grouping in industries will be more effective at next year's Fair and there will be no non-electrical manufacturers exhibiting within the Electrical Section. Arrangements are being made for an E.D.A. kiosk in the centre of the Section, and conferences are to be organised by the E.D.A. and E.C.A. The usual official visits of Associations connected with the industry will be arranged and hospitality will be extended to the visitors as on former occasions. In this connection an effort is being made to devise machinery whereby overseas visitors interested in electrical products will also receive personal invitations to some of these functions, an opportunity being thus afforded for exhibitors to meet them. The Heating and Cooking Section of the B.E.A.M.A. has undertaken to supply the necessary equipment for an electrical kitchen and for pastry cooking to meet the caterers' requirements next February on a larger scale than at the 1930 Fair. Representations are also being made with a view to improving the travelling and accommodation facilities. With regard to the vexed question as to the most suitable period of the year for holding future Fairs, the chairman reported upon the evidence tendered to the Chelmsford Committee in favour of an alteration from February to May or early June, and said that the B.E.A.M.A. was making similar representations.

Registered Electrical Contractors.

Applications for registration from the following were accepted by the executive committee of the National Register of Electrical Installation Contractors at its last meeting:—Graver, Cousins & Co., Ltd., Plymouth; Jackson, V., Liverpool; Johnson & Turner, Ltd., Hyde, Ches.; Erskine, W. D., Dumfries; Biggs, B. L., Wallasey; Beaumont & Blackburn, Dewsbury; Salisbury, F. S., Wallasey; Midland Counties Electrical Engineering Co., Ltd., West Bromwich; Kett, E. A., Saffron Walden, Essex; Harding Bros., Ltd., Hereford; Bewick & Co., Chester-le-Street; Serle, F. J., Taunton; Winstanley, A. E., Wallasey; Chesters, A. E., Ltd., New Brighton. At the same meeting one application was withdrawn and six were declined.

The Australian Budget.

Mr. Scullin, Prime Minister and Treasurer of the Australian Commonwealth, made his Budget statement in the House of Representatives on July 9th. He showed that there would be a shortage of over £14,000,000 in the revenue for 1930-31, of which about £7,800,000 would be due to lower Customs receipts consequent upon a reduction in imports. It was therefore necessary to impose new taxation amounting to £12,550,000. Additions to import duties were one means adopted and the proposals under this head included a "primage" duty of 2½ per cent. on all imports and an increase of 10 per cent. in the duties on radio valves. Income tax would be raised and the postage charges on all letters increased from 1½d. to 2d.

New Swiss Company.

Under the title of the Licht und Kraft, A.G., a company has been formed in Basle with a share capital of 6,000,000 fr. for the establishment and operation of electricity works. The company's first work will be the extension of the electricity works in Belgrade.

A Lighting Glassware Display.

The accompanying illustration is a view of the Manchester showrooms of Messrs. RD. JOHNSON, CLAPHAM & MORRIS, LTD., showing a special display of lighting glassware which has been

A Lighting Glassware Display at Manchester.

arranged there. In addition to the glassware there are extensive ranges of fires, percolators, immersion heaters, kettles, toasters and other domestic appliances.

Electric Homes at Ilford.

We have received from Mr. A. H. Shaw, borough electrical engineer of Ilford, a booklet which is an excellent example of co-operation between public and private enterprise. It deals with two Ilford housing estates which are being developed by Suburban Developments (London), Ltd., and in which all-electric methods are encouraged. Each house is wired throughout to enable lighting, heating, cooking, and washing to be done by electricity. The necessary appliances can be obtained on hire or hire-purchase terms from the Ilford Electricity Department, and full particulars and illustrations of these are included in the booklet. The use of electricity is encouraged by a very favourable two-part tariff—a primary charge of 12½ per cent. per annum on the rateable value and a secondary charge of ¾d. per kWh.

Unemployment in Germany.

The number of unemployed in Germany receiving relief at the end of June amounted to 1,833,000, which was 900,000 more than a year ago. The total number of unemployed was 2,636,000.—*Reuter* (Berlin).

A Business Man's Guide to Canada.

The Department of Overseas Trade has issued a revised edition of the "Memorandum for the Use of Business Visitors to Canada," prepared by Mr. F. W. Field, Senior Trade Commissioner in Canada and Newfoundland. This is a very interesting and useful guide dealing exhaustively with the hundred and one points which are met with by one who visits Canada for the first time and has nobody to "show him round." Railway travelling, hotels and their methods, clothing, banks, trade seasons, representation, credit systems, advertising, geographical features and many other matters are covered in the 42 pages of the booklet.

The E.D.A.-E.L.M.A. Shop and Display Lighting Campaign.

A conference to explain the objects and scope of this campaign was held at the London Lighting Service Bureau on July 11th, Mr. H. Marryat presiding. Mr. V. W. Dale discussed the programme of the campaign and the organisation, and emphasised the enormous scope there was for increased business in shop lighting. With regard to local organisations, he said that the E.D.A. Circles established in 1926 had ceased to function when they had completed their work in connection with the Home Lighting Campaign, but he urged that they should be re-established immediately for the purposes of the coming campaign, and it was hoped that they would remain as permanent committees working for electrical development in their respective localities. The only way to establish new Circles or Committees was for the supply engineers in the various districts to take the initiative, and they would be asked to call meetings of the interested parties locally. The local meetings must be called before the August holidays, in order that arrangements should be completed before the opening of the campaign on September 22nd (the closing date being November 30th). As to the national part of the campaign, it was proposed to circularise 200,000 shops. The supply undertakings generally had been asked to co-operate in the preparation of a mailing list, and already more than 50 per cent. of them, whose districts contained about 70 per cent. of the shops of the country, had sent in their lists. Mr. Dale described some of the literature which would be circulated, and stated that each of the shopkeepers circularised would be offered a book which was a complete treatise on modern shop lighting. The first appeal would be sent out on September 22nd; another letter would be sent a week or ten days later; and later still there would be sent a book dealing fairly extensively with all aspects of shop lighting. A series of advertisements would also be published in all the principal national retail trade papers of the country, in the form of a direct appeal, and articles would also be prepared for publication in the editorial columns of such papers. The local Circles and Committees would be asked to carry out first a shop lighting survey in their districts, and to organise shop demonstrations, trial installations, lectures, competitions, and other features. It was hoped that, as the result of organised effort throughout the industry, a survey of 50,000 shops would be made. To aid the local Circles in this survey a questionnaire booklet had been prepared, containing 25 questionnaire forms, in triplicate, the questions being so framed that the survey could be carried out efficiently during daylight. One copy of each questionnaire form would be retained by the local Circles, one would be retained at the headquarters of each Area, and the third would be forwarded to headquarters in London. With regard to the delivery of lectures locally, expert lecturers were being empanelled, and demonstration equipment would be sent to any town in the country, free of charge, provided an audience of shopkeepers could be guaranteed. The Sub-Committee responsible for the campaign appealed to the Circles to organise at least one trial installation in every town. Suggested details for the carrying out of shop-lighting competitions, judging, and so on, would be circulated from headquarters, the aim being to organise a competition in every town. Mr. W. J. Jones (manager of the E.L.M.A. Lighting Service Bureau), after giving figures to show the enormous scope existing for increasing business in the direction of improving shop lighting, said the full effects of the campaign would not be obvious for a long time. He indicated that headquarters would appreciate the assistance of the industry generally in providing concrete examples of the benefits accruing from, and the effectiveness of, high intensities of lighting, and would be glad to receive photographs with which to illustrate Press articles. The chairman appealed to contractors generally to give their fullest support. Mr. W. R. Rawlings suggested that contractors would benefit by offering to provide installations on the condition that if the owners of the buildings were not satisfied with the results the installations would be taken out free of charge.

A Report on Lithuania.

During 1929 206.2 metric tons of electrical goods and scientific instruments valued at 4,990,300 lits (£102,000 approx.) were imported by Lithuania. This post-war republic has a population of about 2,340,000 and is principally an agricultural state. The demand for electrical products is consequently small and is mainly for goods of a cheap character. In the towns, however, there is a small but growing demand for quality goods. There is severe competition in the market, especially from Germany. This and other information is contained in a recent Department of Overseas Trade report prepared by Mr. T. H. Preston, British Consul at Kovno (Stationery Office, 9d. net).

D

The United States Tariff.

A reprint of the new United States Customs tariff was published with the *Board of Trade Journal* dated July 3rd. It is seen from this that several classes of electrical and allied goods are affected by the new duties, which came into force, generally, on June 18th. Briefly, it may be stated that mica in its various forms is subject to duties ranging from 15 to 45 per cent. *ad valorem*. Arc-lamp carbons less than ¼-in. in diameter are dutiable at 60 per cent.; larger sizes at 45 per cent.; and electrodes and brushes of carbon or graphite at 45 per cent. Incandescent lamps without filaments and with metal filaments are to pay 20 per cent., and those with non-metallic and carbon filaments 30 per cent. The duty on electric storage batteries and parts is 40 per cent. Flexible and rigid conduits are subject to a duty of 30 per cent. Aluminium, copper, brass or steel (unplated with gold, silver or platinum) table, household, kitchen and hospital utensils are dutiable at 40 per cent., and plated goods at 65 per cent. for platinum and gold and 50 per cent. for silver. (These rates are stated to apply to articles "whether or not containing electrical heating elements.") A 35 per cent. duty is imposed on a wide variety of electrical goods under the heading "all articles suitable for producing, rectifying, modifying, controlling or distributing electrical energy." The following classes are particularly specified:—Electrical telegraph (including printing and typewriting), telephone, signalling, radio, welding, ignition, wiring, therapeutic, and X-ray apparatus, instruments (other than laboratory), and devices; and articles having as an essential feature an electrical element or device, such as electric motors, fans, locomotives, portable tools, furnaces, heaters, ovens, ranges, washing machines, refrigerators, and signs. The same rate (35 per cent.) is applied to rubber and gutta-percha moulded insulation and insulating materials and to insulators composed wholly or mainly of shellac or copal. Last week's issue of the *Journal* contained details of the special and administrative provisions of the tariff.

Bankruptcy Proceedings.

Lt.-Col. R. C. LE BUTT, electrical engineer, 177, Regent Street, W.—The first meeting of creditors herein was held on July 9th at the London Bankruptcy Court, the receiving order having been made on the petition of Messrs. Johnson and Phillips, Ltd. Two previous bankruptcies are recorded against the debtor, but he had secured his discharge in both cases. Since 1925 he had been engaged in the formation and operations of Tower Glass Co., Ltd. and Radio Clocks, Ltd. He was appointed a director of the latter company, but resigned all interest in it at the beginning of this year. Debtor estimates his liabilities at £2,400 and has no assets. He attributes his failure to liability in respect of guarantees given on behalf of the two companies; to liability for money advanced on joint promissory notes for the purpose of financing those businesses, and to absence of remunerative occupation. The case was left in the hands of the Official Receiver.

H. F. SPENCE, trading as H. F. Spence & Sons, Honiton, Devon, electrical engineer.—The receiving order herein was made on a creditor's petition recently, and according to the statement of affairs there are liabilities of £1,661, against assets of £448, leaving a deficiency of £1,213. The debtor attributes his failure to loss by depreciation of stock removed from his Sidmouth shop in 1928; damage estimated at £150 to stock; the falling-off of orders for country-house lighting plants due to the Government's electricity scheme; keen competition in the radio business; depreciation of assets, &c. The debtor states that in September, 1923, he commenced business on his own account with a capital of £50, money saved, his principal work being country-house lighting plant installation. He also states that he is the sole proprietor and that his sons were never at any time partners. He says that he did not become aware of his position until June 2nd last, when the business was closed, and the assignment trustee, who then took possession, has since realised £50 by collection of book debts and sale of stock, &c., against which he has incurred expenses amounting to £15. The first meeting was to be held on July 16th and the public examination is fixed for August 14th at the Castle, Exeter.

H. A. ATACK, 442, Borough Road, Birkenhead, Cheshire, electrician and radio apparatus dealer.—The public examination of this debtor was held recently at Birkenhead. The statement of affairs submitted showed liabilities of £522 and assets of £103, leaving a deficiency of £419. The debtor commenced business on his own account in September, 1929, at 442, Borough Road, with a capital of about £55. He attributed his failure to depreciation of stock and fittings, expensive advertising, and inadequate profits. The Registrar observed that the stock in trade had been set down to produce only £100 after costing £350, which depreciation was extraordinarily heavy for trading lasting such a short time. The examination was closed.

J. G. WADSWORTH, 10, Westfield Terrace, Higham Ferrers, Northants, trading as "The Nene Road Electrical Co.," electrical engineer, &c.—The adjourned public examination of this debtor was held recently at Northampton. The statement of affairs showed liabilities of £136, and a deficiency of £126. After questions had been put to the debtor, the case was again adjourned.

G. BLACKMORE, 62, Coventry Road, Market Harborough, Leicestershire, wireless engineer.—The public examination of this debtor was held recently at Leicester. His statement of affairs showed a deficiency of £1,061. The debtor attributed his failure to trade depression, competition, and cost of legal procedure. The examination was closed.

J. W. HUNT, 220, Wells Road, Bristol, electrical engineer.—A statement of affairs submitted at this debtor's public examination disclosed liabilities of over £2,090. The debtor admitted that he ought to have stopped trading before he did. He attributed his failure to the strike of 1926 and bad health.

H. H. D. RADCLIFFE and F. HADDLETON (City Electric Services), electrical engineers, 51, Islington Row, Birmingham.—Trustee, Mr. C. Hoult, 191, Corporation Street, Birmingham, Official Receiver, released June 16th.

G. WILMINGTON, electrical and radio engineer, 75, Railway Street, Nelson.—Trustee, Mr. J. W. Carter, District Bank Chambers, Blackburn, Official Receiver, released June 16th.

W. J. PHILLIS, electrical engineer, 87, Overton Road, Leicester.—Trustee, Mr. E. Barlow, 1, Berridge Street, Leicester, Official Receiver, released June 18th.

S. H. SKIPPER (S. H. Skipper & Co.), electrical engineer, 35, Broad Bridge Street, Peterborough.—Trustee, Mr. F. H. Langmaid, 41, Sydney Street, Cambridge, Official Receiver, released June 16th.

C. SHEPHERD, radio engineer and wireless accessories dealer, 69, Micklegate, York.—First and final dividend of 3s. 0½d. in the £, payable July 17th at the Official Receiver's offices, Duncombe Place, York.

R. DRING, electrical engineer, 257, Freeman Street, Great Grimsby.—Receiving order made on July 8th, on a creditor's petition.

J. C. K. BIRKETT, wireless dealer, 1, Scotland Road, Carnforth.—Receiving order made July 8th, on debtor's petition.

C. KENDRICK, wireless dealer, &c., 52, George Street, and 94, Bright Street, Hull.—Trustee, Mr. E. P. Dutton, Victoria Chambers, Bowlalley Lane, Hull, appointed July 7th.

L. J. SMITH, electrical and radio engineer, &c., 16, George Street, Berkhamsted.—First and final dividend of 3s. 2½d. in the £, payable July 25th, at the Official Receiver's office, 37, Cornmarket Street, Oxford.

Company Liquidations.

BOWYER-LOWE CO., LTD., Letchworth, Herts.—The statement of affairs filed in the compulsory liquidation of this company shows liabilities of £22,759, of which £17,784 is expected to rank for dividend. The deficiency as regards the creditors is £8,624. The issued capital is £5,200, making a total deficiency of £13,824. The following are the principal creditors:—

	£		£
Bakelite, Ltd.	75	Hurst, H.	141
Burndept Wireless (1928), Ltd.	99	Marconi's Wireless Telegraph Co., Ltd.	846
Chloride Electrical Storage Co., Ltd. ...	61	Mullard Wireless Service Co., Ltd. ...	719
Dallow, Lambert and Co., Ltd.	132	McKechnie Bros., Ltd....	64
Davie, Parsons and Co.	78	Ormond Engineering Co., Ltd.	107
Edison Swan Electric Co., Ltd.	146	Pinchin, Johnson and Co., Ltd.	62
First Garden City, Ltd.	265	Recordaphones, Ltd....	12,611
Grosvenor Battery Co., Ltd.	110	Siviter, Smith & Co.	363
		Telegraph Condenser Co., Ltd.	89
		Yearsley, Major R. A.	65

WILLIAM MILLER & SONS, LTD.—Winding up voluntarily. Liquidators, Mr. A. C. Hill, Mr. G. S. Miller and Mr. W. Miller.

JULIENNE & Co., LTD.—Winding up voluntarily. Liquidator, Mr. H. Rainsbury, 65-66, Basinghall Street, E.C.2.

BURFORDS, LTD.—Winding up voluntarily. A liquidator is to be appointed.

CALLINGE & CORRIGAN, LTD.—A meeting of members is called for August 11th, to hear an account of the winding up of the company by the liquidator, Mr. G. Miller.

WYNSOR ELECTRIC RANGE CO., LTD.—Liquidator, Mr. W. H. Stentiford, 1, Broad Street Place, E.C.2, appointed June 20th.

LEO TAYLOR, LTD.—Particulars of claims to the liquidator, Mr. W. Latham, Union Bank Chambers, Lytham, by July 31st.

Private Arrangements.

PETO-SCOTT CO., LTD., radio and electrical manufacturers and distributors, 77, City Road, E.C., 62, High Holborn, W.C., Liverpool and Manchester.—In pursuance of an Order of the Court, a meeting of the creditors of the above was to be held on July 16th to consider a scheme of arrangement. The scheme provides for the payment of preferential claims in full, whilst Mrs. Worthington and the British Radio Gramophone Co., Ltd., who are creditors for the aggregate amount of £14,718, will allow the amounts due to them to remain unpaid and without interest until first debentures to be created have been paid off. In addition, Associated Distributors, Ltd., and

the Bankers' Commercial Security, Ltd., creditors for an aggregate amount of £15,500 in respect of current hire-purchase agreements financed by them, will not take any steps to enforce payment of their claims. In consideration of Associated Distributors, Ltd., continuing to finance the company's hire-purchase agreement, it will receive non-interest-bearing second debentures of £5,000, whilst a further £1,500 of such debentures will be issued to the Bankers' Commercial Security, Ltd., as collateral security in respect of the company's contingent liability under hire-purchase agreements. The scheme further proposes that all the remaining unsecured creditors of the company shall accept a composition of 5s. in the £ in full discharge of their claims. Mrs. A. M. Worthington and Associated Distributors, Ltd., will each advance to the company £2,000 on the security of first debentures, carrying interest at the rate of 7½% per annum. A statement of affairs recently prepared showed ranking liabilities of £29,274 against net assets of £12,941, and a committee was appointed. A petition for the winding up of the company has been adjourned until July 30th pending consideration of the scheme of arrangement.

Dissolution of Partnership.

ELLISON & HILLMAN, wireless factors, 123 and 125, Albion Street, Leeds.—Mr. M. Ellison, Mr. C. Hillman, and Mr. E. M. Hillman have dissolved partnership. Mr. C. Hillman and Mr. E. M. Hillman will attend to debts and carry on the business under the style of Hillman Brothers.

Meetings of Creditors.

ADAMS & CO., LTD.—A meeting of creditors was held on July 11th at the Accountants' Hall, 60, Spring Gardens, Manchester.

BORLESLEY ELECTRICAL ACCESSORIES CO., LTD.—A meeting of creditors was held on July 11th at Daimler House, Paradise Street, Birmingham.

RAMSBOTTOM ELECTRICAL HEATING & LIGHTING CO., LTD.—A meeting of creditors was to be held on July 16th at 52, Bolton Street, Ramsbottom.

Social Events.

Saturday, July 5th, turned out to be a perfect day for the eighteenth annual athletic sports of the METROPOLITAN-VICKERS ELECTRICAL CO., LTD., Athletic Club, which were held at the grounds of the Manchester Athletic Club, Fallowfield, and witnessed by a large number of employés and friends. The two-mile cycling championship was won by Mr. N. Walsh for the third year in succession, and the silver departmental challenge cup went to the Mechanical Section. The 5-mile sealed handicap, another important event, was won by Mr. A. L. Wilson, but the general performance was so good that the committee decided to award a special prize to each competitor who finished the course. The tug-of-war, ladies' obstacle race, team relay race, half-mile handicap, and little girls' race all provided the usual interest and amusement. The prizes were presented by Mrs. G. E. Bailey.

The G.E.C. travellers' annual launch outing took place on June 28th, when the weather was gloriously fine. The party numbered 75, and boarded the S.L. *Grand Duchess* at Windsor Bridge and proceeded up the river to Reading. Sir Hugo Hirst, Bt., Mr. M. J. Railing, Mr. J. Y. Fletcher, Mr. L. C. Gamage and Mr. H. W. Roberts, of the G.E.C. directorate, accompanied the party, together with Mr. Edward Hirst, of the British General Electric Co., Ltd., Australia.

Favoured by ideal weather, Messrs. PAGE & MILES, LTD., Brighton, held their annual outing on July 5th. The party, numbering about 90, travelled to Hampton Court, *via* Cuckfield, Horley, and Long Ditton. At dinner, Mr. and Mrs. J. H. Miles were presented with a silver rose bowl and an illuminated album, on celebrating their silver wedding on June 21st last. A start for home was made at 7.30, the return route being *via* Esher and Leatherhead.

The employés of Berry's Electric (1928), Ltd., held their annual outing at Stratford-on-Avon on July 5th. The head office staff travelled down by train, meeting representatives of the Birmingham and Manchester houses there. After luncheon, the party adjourned to the river where boating, bathing, &c., appeared to be the order of the day, thanks to the glorious weather which prevailed.

The annual outing of the Positive Electric Co. took place at Clacton-on-Sea on July 3rd, the journey being made by motor coach. The party included Mr. J. F. Creasey (proprietor), the staff and guests (30 in all).

Book Notices.

"Regulations of the Electrical Association of Czecho-Slovakia." Pp. 269. Prague: Elektrotechnicky Svaz Ceskoslovensky.—The Technical Committees of the Elecktrotechnicky Svaz Ceskoslovensky (Czechoslovak Electrical Association) in Prague, have been working for 10 years on these regulations and on standard electrical specifications. Three volumes of the regulations and of the standard specifications were published in the years 1920, 1923, 1925. The standard specifications are omitted in the new edition. The regulations of the E.S.C. are a collection of rules approved by the Czechoslovak Government ministries. The book includes data on units, symbols, electrical machines, materials for electric installations, lighting, overhead transmission network, crossing of wires, service instructions, special electrical installations, installations in mines, electric railways, installations for electro-medical purposes, electrical communication, radio apparatus, international rules of the I.E.C., legislation, uniform terms, index of standards of the E.S.C., &c. The regulations are of economical importance for the Czechoslovak Republic, because of the standardisation of electrical work which they have accomplished. They are easy to understand and can be easily supplemented by new rules. The book is an authentic reference work on electrical engineering data which is a standard for thousands of electrical engineers and firms throughout Czecho-Slovakia.

As a result of the growing interest which is being manifested in the question of the electrification of railways in Spain, with special reference to the schemes brought forward for approval by the Compania de Madrid a Zaragoza y a Alicante, a series of articles by Senor Emilio Siegrist Spinedy has been begun in the June issue of the *Revista Ingeniera Industrial*, on the "Calculation of the Systems of Distribution in Electric Railways." The first article discusses the tractive efforts and the instantaneous consumption of energy.

The Siemens-Schuckert Company has issued a comprehensive publication describing some of the many steam and hydro-electric power installations carried out by the company. The publication, which is profusely illustrated, contains some excellent photographs of the Shannon Scheme.

"Overhead Expense," by A. H. Church. Pp. viii+418; figs. 107. London: McGraw-Hill Publishing Co., Ltd. Price 25s. net.

"Street Lighting Practice," by W. Harrison, O. F. Haas and K. M. Reid. Pp. ix+270; figs. 155, tables and curves. London: McGraw-Hill Publishing Co., Ltd. Price 17s 6d. net.

Trade Announcements.

Practically the whole of the issued shares of Alloy Welding Processes, Ltd., Walthamstow, E.17, have been purchased by MUREX, LTD., Rainham, Essex, whose business is the treatment of complex ores and the manufacture of various alloys and of carbon-free metals. Murex, Ltd., also owns the share capital of the Premier Electric Welding Co., Ltd., and Thermit, Ltd. The works of the Premier Electric Welding Co. will shortly be removed to the works of Alloy Welding Processes, Ltd.

The head office of the DUSSEK BITUMEN CO., LTD., has been removed to 13, Regent Street, S.W.1. (Telephone: Gerrard 7792/3.)

Messrs. SMITH & HAMMOND, LTD., have removed to more convenient premises at Buckingham House, Buckingham Street, Strand, W.C.2. (Telephone: Temple Bar 5063.)

The HENDERSON WIRELESS AND ELECTRICAL SERVICE, Brighton, is opening a branch at 109, Chapel Road, Worthing. (Telephone: Worthing 1845.)

The offices of Messrs. E. M. EVANS & SON, LTD., have been moved to 5, Gore Street, Piccadilly, Manchester.

The Aktiebolaget Birka Regulator, 21 Cockspur Street, S.W.1, announces that the British Empire rights under the "Birka" patents have been acquired by the BIRKA REGULATOR CO., LTD., (whose registration is recorded in the "New Companies" section of this issue). The new company's address is 19-21, Palace Street, Westminster, S.W.1.

PHILIPS LAMPS, LTD., London office, announces that on July 21st its trade counter will be removed from 145, Charing Cross Road, W.C.2, to 6a, Ridgmount Street, W.C.2. (turning off Store Street, Tottenham Court Road).

The DOUGLAS ELECTRIC LIGHTING CO., LTD., Winder House, Douglas Street, S.W.1, has taken over the sole selling rights for "Delco-Light" plants and "D.-L." water systems.

The METROPOLITAN-VICKERS ELECTRICAL CO., LTD., has opened a new depôt at Mervyn House, Frederick Street, Cardiff, for the sale of "Cosmos" lamps in the Cardiff district. Sales in the Swansea area will be conducted from the company's existing offices at 62, Wind Street, Swansea.

An Inquiry from India.

In a recent letter to us Messrs. KHATRI AHMED ABDULLAH AND BROS., Old Market, River Road, Karachi, state that they wish to get into touch with suppliers of electrical goods, specially mentioning the following classes:—Installation materials, lamps, shades, lampholders, switches, cut-outs, wires, fans, heating and cooking apparatus, and electrical novelties. Messrs. Abdullah state that they usually buy on their own account and prefer prices in English currency on f.o.b. or c.i.f. delivery terms. They usually pay cash against documents through their English buying agents.

The "Holophane" Overseas Agents' Conference.

In our last issue we made reference to the conference of its overseas agents organised last week by Holophane, Ltd. We have now received the programme of this conference, from which it is seen that several interesting and useful papers were presented by illumination experts. These included "Recent Researches in Illumination," by Dr. J. W. T. Walsh (president of the Illuminating Engineering Society); "Street Lighting," by Prof. J. Teichmüller, of Karlsruhe; "Kinema and Theatrical Colour Lighting," by Mr. R. G. Williams; "Science in the Service of Illuminating Glass Manufacturers," by Dr. S. English; "Illumination from the Architect's Point of View,"

by Mr. Gray Wornum, F.R.I.B.A.; "Modern Interior Lighting," by Mr. H. Robertson, F.R.I.B.A.; "Holophane Developments," by Mr. E. Stroud; and "The Practical Application of Holophane Products," by Mr. L. M. Tye.

New Municipal Showrooms and Offices.

The new showrooms and offices of the Walsall Corporation's electric supply undertaking were inaugurated on July 10th by Alderman J. Thickett, an ex-chairman of the Electric Supply Committee. The adaptation of the old borough offices, formerly occupied by the Inland Revenue Authorities, has been carried out, the ground floor being occupied by a commodious showroom replete with electrical devices for the home, and a demonstration room adjoining. In the basement is a transformer sub-station to meet the needs of the district.

The Autumn Leipzig Fair.

The following dates have been fixed for the Autumn International Exhibition at Leipzig:—General Samples Fair, August 31st to September 5th; Technical and Building Fair: August 31st to September 5th; and Sports Goods Fair: August 31st to September 4th.

E.D.A. Activities in Birmingham.

The Birmingham Circle of the British Electrical Development Association at a meeting last week decided to purchase a plot of land as near to the centre of Birmingham as possible for the purpose of building and equipping an all-electric house for show and demonstration purposes, the approximate expenditure, exclusive of the cost of furnishing, to be between £2,000 and £2,700. It was also decided to obtain permission to install electric lighting in five shops in different centres of the city to demonstrate correct illumination methods.

B.T.-H. Magnetos in the King's Cup Race.

In this year's King's Cup Air Race, the machines gaining first, second and third places, and 85 per cent. of the machines completing the course, were fitted with B.T.H. magnetos.

A "D.P." Prize Tableau.

One of the D.P. BATTERY Co.'s electric lorries converted into the S.Y. *Kathanode*, was one of the prizewinners at carnivals held at Bakewell on June 28th, and Buxton on July 5th. The lorry on which this exhibit was constructed was driven by "Kathanode" batteries, and was headed by a jazz band.

An Important Contract for Siemens Bros.

It was reported from Egypt last week that a contract valued at over half-a-million sterling had been awarded to Messrs. SIEMENS BROS. & CO., LTD., Woolwich, in connection with the River Nile delta electrification scheme. The Alexandria correspondent of *The Times* reports that the lowest offer, about £60,000 less, was submitted by an Italian firm, but it was considered that the English company's material was superior.

New Companies Registered.

During the first half of the current year particulars were given in our "New Companies Registered" section of no fewer than 208 concerns connected with the electrical and radio industries. In the first half of 1929 details of 211 new companies were given in this section.

The "Living Poster" Ball.

A "Living Poster" ball, held in aid of charity on July 8th, included a pageant consisting of different episodes connected with large organisations in this country. One feature was a representation of "Lighting Throughout the Ages." In this Mrs. Wilfred Ashley, Lady Evelyn Graham, and Mrs. Carl Bendix represented the "General Electric Co., Ltd." They were dressed in a creation of millions of scintillating pinpoint glass sequins, which, when G.E.C. spotlights and lighting effects were played on them, produced magnificent results.

Unemployment.

There was an increase of 75,258 in the number of persons on the registers of Employment Exchanges in Great Britain during the week ended June 30th. At that date the total was 1,890,600, as compared with 1,815,342 on June 23rd, and 1,142,382 on July 1st, 1929. It is estimated that on June 23rd there were approximately 9,719,400 insured persons aged from 16 to 64 in employment in Great Britain.

American Acquisition in France.

The extension of its European interests to France through the acquisition of approximately a one-third interest in L'Union Electrique Rurale, one of the most important French public utility systems, is announced by the Public Utility Holding Corporation of America. The holdings of the American corporation and those of the French interests with which it is associated in the management of the properties represent together a substantial majority of the outstanding voting shares.

Australia and British Electric Stoves.

The *Sydney Morning Herald* reports that the Australian Minister for Trade and Customs has consented to the importation from the United Kingdom and Canada of electric stoves wired to Australian voltages which were manufactured prior to April 4th, 1930, subject to satisfactory evidence on that point being produced to the official representative of the Department of Trade and Customs in London or New York.

New Zealand's Electrical Imports.

According to the *Board of Trade Journal* the imports of all kinds of electrical machinery and equipment into New Zealand during the first quarter of the current year had a total value of £533,285. Of this the United Kingdom was credited with £297,003; the United States with £143,315; Canada with £44,241; and Australia with £7,518. The figures for the corresponding period of last year were:—Total, £489,193; United Kingdom, £261,251; United States, £112,144; Canada, £40,712; and Australia £8,799.

Greek Telephone Concession.

A concession has recently been granted by the Greek Government to the Siemens & Halske Co., Berlin, for the working of practically the whole of the telephone system throughout Greece. The concession provides for the extension of telephonic communication in the country and the modernisation of existing exchanges. In Athens and the Piræus 7,000 automatic connections, in Salonika 3,000 and in Patras 1,000 are to be provided within the next few years. The concessionaires have undertaken to transfer the working of the system to a new company to be organised with an initial capital of £500,000, which, while being mainly subscribed by the German company, will be provided partly by Swedish and Greek interests.

New Belgian Company.

Under the auspices of the Société de Traction et d'Electricité, a new company has just been formed in Brussels with a capital of 80 million francs (about £457,140) and the title of La Société Générale Africaine d'Electricité to take over the distribution of the power generated by the Société Générale des Forces Hydrauliques du Katanga and the concessions for the distribution of power in Elisabethville and Panda-Likasi, in the Belgian Congo.

For Sale.

Messrs. Guest, Keen & Nettlefolds, Ltd., offer for sale a turbo-alternator with condensing plant, &c.

The West Central Merchandise Mart will sell by auction on July 23rd, at 6, Hanway Place, Oxford Street, W.1, the stock of electric motors, accessories, and cables.

Liverpool Corporation invites tenders for the sale of steam generating sets, switchboard, boiler feed pumps, overhead crane, electric lifts, superheaters, &c.

The Pembrokeshire Power Co., Ltd., Tenby, has for sale generators and a switchboard.

(See our advertisement pages to-day).

Central Electricity Board Contracts.

The Central Electricity Board has recently placed further important contracts in connection with the electricity schemes which are now being carried into effect. These include:—

(1) Contracts for the supply of h.p. cables for the North-West England and North Wales, and the South-West England and South Wales schemes with British Insulated Cables, Ltd.; W. T. Glover & Co., Ltd.; Siemens Bros. & Co., Ltd.; and Standard Telephones and Cables, Ltd.

(2) Contracts for switchgear for the Central England, Mid-East England, and North Wales schemes with the British Thomson-Houston Co., Ltd.; Ferguson, Pailin, Ltd.; the General Electric Co., Ltd.; the Metropolitan-Vickers Electrical Co., Ltd.; and A. Reyrolle & Co., Ltd.

(3) A contract for the supply of general meters for the North-West England and North Wales scheme with Landis and Gyr, Ltd.

The total value of these and other contracts recently placed amounts to nearly £550,000.

Our Overseas Electrical Trade during June.

The Board of Trade returns show that our electrical exports during June were:—Goods and apparatus, £874,085; machinery, £483,584; total, £1,357,669. This total represents a decrease of £260,651 as compared with May last, and a decrease of £26,083 as compared with June, 1929. The total value of electrical imports was £569,591, made up as follows:—Goods and apparatus £423,836, and machinery £145,755. The total was £134,699 lower than that for May and £52,557 below the June, 1929, figure. Details of the trade will appear in our next issue.

New Catalogues and Lists.

Messrs. AVELING & PORTER, LTD., Rochester.—An illustrated leaflet describing the "Invicta" Diesel engine.

BRITISH DARDELET THREADLOCK (D.D.G.) CORPORATION, LTD., 42, Kingsway, W.C.2.—An illustrated booklet describing "Dardelet" bolts and nuts, with reports of tests made by the National Physical Laboratory.

ATELIERS DE CONSTRUCTIONS ELECTRIQUES DE CHARLEROI, 56, Victoria Street, S.W.1.—A stock list for July of a.c. and d.c. motors, transformers, &c.

Messrs. WOLF & MORGAN, LTD., 66, Victoria Street, S.W.1.—An illustrated catalogue describing "Time-O-Stat" automatic controls for oil burners, for which the company is the sole European distributor. Also a price list of these controls, and a stock list for July of Wagner a.c. and d.c. motors.

Messrs. FALK, STADELMANN & Co., LTD., 83-93, Farringdon Road, E.C.1.—A well-produced and illustrated catalogue of electric lighting units specially designed to harmonise with modern decorative treatment. Priced.

BROOK MOTORS, LTD., Empress Works, Huddersfield.—A list of "Brook" motors (single-, two-, and three-phase), and a net price list of the company's totally-enclosed, surface-cooled a.c. motors.

DRAYTON REGULATOR AND INSTRUMENT CO., LTD., West Drayton, Middlesex.—An illustrated leaflet drawing attention to the company's packless radiator valve.

MARCONIPHONE CO., LTD., 210-212, Tottenham Court Road, W.1.—The "Marconiphone Mail," dealing particularly with the company's portable radio set, Model "55"; also the fifth of Capt. Eckersley's service articles.

ALLOY WELDING PROCESSES, LTD., Ferry Lane, Forest Road, E.17. Bulletin No. 60, dealing with "A.W.P." special alloy electrodes for the welding of corrosion- and heat-resisting steels and alloys.

MARTINDALE ELECTRIC CO., LTD., The Hyde, Hendon.—A carbon brush maintenance and trouble chart, being an analysis of causes and effects of brush and commutator troubles in d.c. motors and generators.

Prices of Materials.

Messrs. Edward Till & Co. report, July 15th: India-rubber, Para fine, 7d., ¼d. decrease.

Messrs. James & Shakespeare report, July 15th: Copper bars (best selected), sheet and rod, £81, £2 decrease. English pig lead, no change.

Messrs. James Forster & Co., in their letter dated July 11th, stated that in the lead market last week a little outside selling made its appearance, but support from producing interests was renewed and prices were bid higher again. Demand remains very quiet with consumption fairly well maintained, but arrivals are likely to be short this month, while there seems a likelihood of smaller arrivals next month also. "We still believe that the position is an artificial one and the present price unjustified, but with present tactics of producing interests it is quite possible that, if only for a short time, lead will be pushed up to a higher level."

Lighting and Power Notes.

Accrington.—INDUSTRIAL POWER CONCESSION.—The Corporation Electricity Committee has decided to increase the rate of discount for prompt payment by industrial power users from 10 to 15 per cent.

YEAR'S WORKING.—The accounts of the Corporation electricity undertaking for the year ended March 31st last show a gross revenue of £82,132 and a working expenditure of £41,948, leaving a gross profit of £40,184. After deducting capital and other charges there was a net surplus of £6,886. The electrical energy sold amounted to 17,907,615 kWh.

Australia.—ELECTRICITY SCHEME FOR LITHGOW AREA.—According to a Government scheme it is expected that the Lithgow power station and that to be erected in connection with the Wyangala Dam, will provide energy for the whole of the western and south-western districts. The *Sydney Morning Herald* states that the line from the Railway Commissioners' power house at Lithgow will go overland for part of the way, but will largely follow the railway line. A survey party will occupy two months preparing the route. The line to Bathurst has been erected to within six miles of the city, and poles are in position six miles beyond. Although Orange is the present destination, there is a move on the part of Molong Council to benefit from the supply. It is stated that experts have in view a scheme to supply the country west of that centre.

PROPOSED EXTENSION OF NYMBOIDA HYDRO-ELECTRIC SCHEME.—The Clarence River County Council is to bring up before the Government a scheme costing between £120,000 and £130,000 for the extension of the Nymboida hydro-electric scheme down the coast.

Bangor.—YEAR'S WORKING.—Mr. Price White, electrical engineer to the Bangor Corporation, in his annual report for the year ended March 31st last states that the net profit on the electricity undertaking amounted to £951. The total output increased from 992,000 kWh in 1928-29 to 1,134,000 kWh in 1929-30. The addition of lamps, radiators, cookers, and motors connected to the mains, totalling 187 kW, made the total connections 1,900 kW. The present state of negotiations for reduced bulk supply charges was such that the undertaking was assured of a reduction for all energy in excess of that for last year's monthly totals.

Barrow.—YEAR'S WORKING.—The annual report on the electricity undertaking for the year ended March 31st last shows a total income of £93,715, as compared with £100,115 in 1928-29. The working expenditure amounted to £54,844, as against £60,234, leaving a gross profit of £38,871 (£39,881), to which was added £3,278 from public lighting, £668 from hire of motors and apparatus, and £322 profits on private connections, making a total of £43,139 available. After deducting loan charges (£14,249) and sinking fund (£19,234), there was a net surplus of £9,656, as against £13,113 in 1928-29. The aggregate capital expenditure on the undertaking is now £540,922, of which £30,992 was spent during the year, the principal item being £16,282 for mains. The electricity sold increased from 17,700,214 to 17,737,952 kWh; the maximum load was 6,200 kW. The plant installed at the Buccleuch Street works during 1928-29 was completed, and was in practically continuous operation during the last three-quarters of the year. During the year 511 new consumers were connected to the mains, this being the largest increase during any year since 1920-21. Assisted wiring and hire-purchase schemes have been inaugurated.

Buckie.—SPECIAL ORDER GRANTED.—The Electricity Commissioners have granted the Town Council a Special Order for the installation of electricity for the town and harbour, the scheme being estimated to cost £16,000.

Canada.—NEW POWER PLANT IN NOVA SCOTIA.—The Dominion Steel and Coal Corporation, Ltd., has just brought into operation its new 10,000-h.p. generating station completed recently at a cost of $1,000,000. This new generating plant uses pulverised coal from the company's mines and has been erected to supply electricity for the operation of the collieries in Cape Breton Island.

THE ST. LAWRENCE WATERWAY.—The report of the conference between the members of the Canadian section of the Joint Board of Engineers and representatives of the Ontario Hydro-electric Commission, who have been investigating the navigation and power possibilities of the international section of the St. Lawrence River, recommends a double stage seaway and power development to cost $274,000,000. While differing in minor respects, the report mainly agrees with the recommendations advanced by the Canadians in their conference with the United States section of the Joint Board some years ago. A double stage development is again recommended with an upper dam and power house to be built at Crysler Island and lower similar works at Barnhardt Island. This would entail, according to the report, less land flooding and less embankment construction than would be involved in a single stage project with dams and power plants concentrated at Barnhardt Island which was recommended by the United States personnel of the Joint Commission.—*Reuter* (Ottawa).

Colchester.—YEAR'S WORKING.—An increase in the total revenue from £50,269 to £55,739 is shown in the accounts of the Corporation Electricity Supply Department (engineer: Mr. Wm. Frisby) for the twelve months ended March 31st last. Working expenses amounted to £34,233, as compared with £27,182 in the preceding year, while the gross profit fell from £23,087 to £21,506. To this was added a profit from the trading account making a total of £21,902 available. After making provision for loan interest (£15,021) and sinking fund (£6,709), there was a net surplus of £172, as compared with £2,487 in 1928-29. The electrical energy sold increased from 4,154,895 to 5,124,978 kWh and the maximum supply demanded from 2,800 to 3,330 kW. The net average price obtained (excluding meter rents) per kWh fell from 2.809d. to 2.479d.

LOANS.—The Town Council has applied for sanction to a loan of £10,400 for the development of the electricity undertaking in the Walton-on-Naze urban district. Subject to the Special Order in respect of the Walton district being obtained, application is also to be made for sanction to a loan of £10,996 representing the purchase price of the undertaking (£10,546), and £450 unborrowed capital expenditure by the Walton Urban District Council on the undertaking. In view of the prohibitive cost of underground cables, the l.p. distribution in West Mersea is to be effected wholly by overhead lines.

BULK SUPPLY.—The Frinton-on-Sea & District Electric Light and Power Co., Ltd., has written inquiring the Council's terms for a bulk supply to the Brightlingsea undertaking.

Continental.—SWITZERLAND.—Work at the Krembs hydro-electric works is being actively pushed forward. According to the plans drawn up, the two first sections of the power station are to come into operation at the end of 1932. The three others will follow successively throughout 1933, and they should all be in full operation by October of that year. The annual output of energy at Krembs by then is estimated at 750 million kWh.

ITALY.—La Società Generale Italiana Edison di Elettricità of Rome has recently secured a concession to establish a plant to utilise the water power of Lakes Camposecco and Cingino in the province of Novara. It is estimated that over 4,000 h.p. is available.

Darwen.—YEAR'S WORKING.—For the eleventh successive year Darwen electricity undertaking has been able to report a satisfactory balance, the increase in the sales of electrical energy amounting to over half a million kWh. The net profit is £6,959 as compared with £6,686 last year.

Doncaster.—ASSISTED WIRING SCHEME.—The Town Council has approved in principle a recommendation of the borough electrical engineer to adopt a scheme for the wiring of houses on the hire or hire-purchase system. The engineer is to submit proposals for such installations and apparatus for houses in streets where mains are already laid.

Dumfries.—IMPROVED LIGHTING SCHEME.—The Town Council has adopted a proposal by the Lighting Committee for a new and comprehensive scheme of improved lighting at a cost of £5,000, one half of which is to be proceeded with at once.

Glasgow.—MAINS EXTENSIONS.—The Corporation Electricity Committee recommends the laying of distribution mains at an estimated cost of £1,612.

HOSPITAL LIGHTING.—The Corporation Health Committee recommends that the work of renewing the lighting internal wiring system at Ruchill Hospital be carried out at a cost of £2,315, and that the general manager of the electricity department shall prepare a specification.

Godalming.—AGREEMENT WITH ALDERSHOT COMPANY.—The Corporation Electricity Committee recommends that the Council's seal be affixed to the draft agreement between the Corporation and the Aldershot Gas, Water and District Lighting Co., Ltd., embodying the terms under which the Corporation is prepared to transfer its electricity undertaking to the company.

Hastings.—STREET LIGHTING IMPROVEMENTS.—The Corporation Electricity Committee is to improve the lighting in Old London Road at a cost of £1,000.

Hawarden.—EXTENSIONS.—The Rural District Council has under consideration the question of supplying electricity to Leeswood, and the engineer has been asked to report regarding the obtaining of a Fringe Order. With regard to the extensions to Penyffordd, Hope, and Coed Talon, permission has been received to borrow £4,075 for this work which has been started and is due to be completed by August 23rd.

Isle of Wight.—PROPOSED PURCHASE OF UNDERTAKINGS.—At a recent meeting of the Newport Corporation, a letter was read from the Shanklin Urban District Council stating that the Council, in conjunction with the Sandown Council, had been considering proposals for exercising the power to purchase the electricity undertakings at Sandown and Shanklin. A suggestion had also been made that other local authorities possessing similar powers under the local Orders might, with advantage, join in a scheme for acquiring the electricity undertakings in the principal urban areas in the island. The letter asked whether Newport Council would be disposed to consider proposals for exercising a similar option under the lighting Order in force in the district. It was decided to defer the further consideration of the matter for a month.

Kendal.—LOAN SANCTIONED.—The Town Council has received sanction to a loan of £4,604 for excess expenditure on extensions to the power station. The Council is negotiating for a site for a sub-station needed for the pending change-over.

London.—HOSPITAL LIGHTING INSTALLATION.—The London County Council Mental Hospitals Committee recommends the installation of electric lighting at the Colney Hatch Mental Hospital at a cost of £22,500.

Loughborough.—YEAR'S WORKING.—The report on the Corporation electricity undertaking for the year ended March 31st last records a total revenue of £51,457 and an expenditure of £52,156, leaving a deficiency of £699. A reduction in the charges for electricity for power and heating cost the undertaking £2,600.

Manchester.—PROGRESS DURING MAY.—During the month of May the Corporation electricity undertaking showed an increase in connections of 2,288 kW, bringing the total up to 429,267 kW. Applications received for supplies including additional supplies numbered 1,412 and represented a total of 3,219 kW. The number of hired cookers connected increased by 141, making a total of 6,344 now on circuit. Applications for the hire of cookers numbered 141. Two new sub-stations were put into commission and new plant was installed at five existing sub-stations. The change-over from d.c. to a.c. had been completed in the cases of 10,830 consumers up to June 4th, while sanction had been given and work was in progress involving 1,578 consumers.

Otley.—ELECTRICITY SUPPLY.—The Urban District Council Finance Committee recommends that permission be granted to the Electrical Distribution of Yorkshire, Ltd., to supply electricity for all public and private purposes within the urban district of Otley, including the rural parishes of Newall-with-Clifton and Farnley.

Penmaenmawr.—HIRE-PURCHASE SCHEME FOR COOKERS.—The Urban District Council has had under consideration a scheme of hire-purchase under which domestic electrical appliances may be purchased from the Electricity Department, and has decided to adopt the engineer's scheme in respect of cookers only for the present.

Peterborough.—LOAN SANCTIONED.—The Corporation Electricity Committee has received sanction to the borrowing of £12,300 for plant.

Portsmouth.—MAINS EXTENSIONS.—The Corporation Electricity Committee has received sanction to the borrowing of £9,500 for e.h.p. mains in the city.

Price Reductions.—Reductions in charges for electricity have been made or recommended in the following districts:—

CHESTER.—Domestic "unit" charge: From 0.7d. to 0.6d.; the fixed charge of 10 per cent. of the net annual value of the premises remains unaltered. For industrial heating and cooking, &c., there is also a reduction of 0.1d. per kWh. In Hoole, Newton, Great Boughton, &c., the domestic tariff standing charge of 15 per cent on the net annual value of premises remains and the "unit" charge of 0.75d. is reduced to 0.65d.; for industrial heating and cooking the charge of 0.75d. per unit is reduced to 0.65d. per kWh.

DARWEN.—Domestic lighting: From 5d. to 4¾d. per kWh for the first 30 kWh, and ½d. per kWh less for all energy consumed in excess of 30 kWh per quarter. There is ½d. per kWh reduction for shop window and special lighting. Industrial power: First 500 kWh per quarter reduced from 2½d. to 2d. per kWh, with further concessions to larger consumers. Domestic power, &c.: The charge is reduced ½d. per kWh for the first 30 kWh. Contracts will be subject to a discount of 35 per cent. against 27½ per cent.

HORNSEY.—Lighting: First 600 kWh per quarter, from 3¾d. to 3½d. per kWh.

Ripon.—ASSISTED WIRING SCHEMES.—The Corporation Electricity Committee has adopted two assisted wiring schemes and is to invite contractors (irrespective of area) to submit tenders for carrying out the work.

Ross.—CABLE EXTENSIONS.—It was reported at a recent meeting of the Rural District Council that the Shropshire, Worcestershire and Staffordshire Electric Power Company has been given permission to lay an underground cable from the Ross electricity works to a point at the rear of 38 Overross, and thence to erect an overhead line to the Ross urban district boundary in connection with the main supply between Ledbury and Ross.

Sheffield.—LOAN SANCTIONED.—The Corporation Electricity Committee has obtained sanction to the borrowing of £40,000 for mains and services. This is part of the loan applied for in respect of expenditure on works proposed to be carried out as relief works.

Stanley (Co. Durham).—YEAR'S WORKING.—During the past three years the consumers of the Urban District Council's electricity undertaking have increased from 216 to 1,491. The report for the year ended March 31st last states that increased consumption has reduced the cost of production from 1.32d. per kWh two years ago to 1.03d. during the past year. The total cost of production was £2,760 and the income £8,172; in 1928 the revenue was £5,698 and in 1929 £7,854. The balance on the net revenue account for the year is £1,274.

Stockport.—LOAN FOR GENERATING PLANT SANCTIONED.—With regard to the application of the Town Council for sanction to a loan of £260,000 for the development of the electricity works, the Electricity Commissioners have sanctioned a further sum of £30,000 for generating plant, and have asked for particulars regarding the river retaining wall before sanctioning any further sum in respect of buildings and civil engineering works.

Watford.—OFF-PEAK SUPPLIES.—The Corporation Electricity Committee is to supply electricity at a special low rate for the heating of swimming baths, large works, business premises, offices, &c., between the hours of 11 p.m. and 7 a.m.

West Hartlepool.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking for the year ended March 31st last show a total revenue of £82,952 and a working expenditure of £64,662. The surplus of £21,426 was dealt with as follows:—Interest, £7,342; repayment of loans, £11,853; net balance, £2,232. Of this balance it was decided to place £2,000 to distribution expenditure and £232 to reserve, which now amounts to £20,008. The balance of assets and capital expenditure over liabilities now amounts to £207,000.

Wigtown.—PROPOSED ELECTRICITY SUPPLY.—At a recent meeting of the Wigtown County Council, an application was submitted on behalf of the Holderness Trust, Ltd., asking the Council to consent to a Special Order in connection with the proposed electricity supply for the county. The agents pointed out that supplies from the Central Electricity Board would in due course be available at Glenluce and Newton-Stewart, and they contemplated laying 23 miles of 11,000-V mains from Newton-Stewart to Wigtown, from Glenluce to Stranraer, and from Stranraer to Port Patrick. They contemplated a capital expenditure during the first three years of £35,500. A committee was appointed to meet representatives of the Holderness Trust.

York.—OSBALDWICK TRANSFORMING STATION.—The Central Electricity Board has acquired land at Osbaldwick for a primary transforming station, and proposes to make its connection to Foss Islands power station by means of a 66,000-V overhead line running into York along the Derwent Valley Light Railway, subject to agreement with the Corporation and the railway company. The Board is also to purchase or lease a small plot of land near the Corporation's proposed new sub-station for the accommodation of two 10,000-kVA transformers.

Tramway and Railway Notes.

Argentina.—BUENOS AIRES.—Early last Saturday a crowded tramcar of the Compañia Tramways Electricos del Sud, travelling over a bridge from the southern suburbs to Buenos Aires, plunged into the River Riachuelo, which separates Avellaneda from the Federal capital. *The Times* says that out of about 70 passengers there are only four survivors. Fifty-two bodies have been recovered. The accident is alleged to have been due to the driver not observing that the movable section of the bridge was up.

Australia.—THE N.S.W. GOVERNMENT RAILWAYS.—An interesting exhibition of lantern slides was given last week at Australia House, Kingsway, by Mr. W. S. Corner, the chief assistant electrical engineer to the New South Wales Government Railways, dealing with the progress made in regard to the electric railway and tramway systems during the past few years. A description was given of the many difficulties which had had to be faced in the carrying out of the schemes of electrification, and of the various methods by which these difficulties had been overcome. A film which Mr. Corner had intended to show was unfortunately delayed on its way from Berlin where it had been exhibited at the World Power Conference; it is hoped, however, that it will be possible to show it at a later date.

Continental.—GERMANY.—What is stated to be the first change-over in Germany from ordinary petrol-'buses to railless-cars is about to be made on the service between Mettman and Gruiten, a distance of about 4½ miles.

BELGIUM.—At the request of the Government, the Société Nationale des Chemins de Fer Belges is to take up the question of electrifying the railway between Brussels and Antwerp. The work is expected to cost between £55,000 and £64,000 per mile.

Hove.—PROPOSED 'BUS AND TRAM AMALGAMATION.—At a meeting of the Town Council held last Friday it was stated that tentative terms for the merging of the Tilling local omnibus service and the Brighton Corporation tramways into one body had been embodied in a draft agreement. The matter was not sufficiently advanced, however, to be submitted to the meeting, but it was probable that the Brighton Town Council would fully discuss the terms at its next meeting.

London.—L.C.C. TRAMWAY ACCOUNTS.—The accounts of the London County Council Tramways undertaking for the year ended March 31st state that the total revenue receipts, including receipts in reduction of cost of renewals and repairs amounted to £4,460,536, as compared with £4,373,944 in 1928-29. Working expenses decreased from £3,684,987 to £3,613,329, leaving a gross surplus of £847,207 (£688,957). After providing for capital and other charges there was a net surplus of £128,804, as compared with a net deficiency of £6,790 in the preceding year. The net capital expenditure during the year amounted to £294,907, bringing the total now spent on the undertaking to £17,719,199, of which £2,835,366 is regarded as having become obsolete. It is several years since a surplus balance was shown on the accounts, and the Finance Committee has decided, as the balance is small in relation to the revenue of the year, not to take any special steps in regard to the repayment of obsolete capital, but to carry forward the surplus to the current year's accounts.

UNDERGROUND BREAKDOWN.—A delay lasting eight minutes occurred throughout the whole Underground system last Monday shortly before 10 a.m. due to the failure of a generator at Lot's Road power station.

Scarborough.—TRAMWAY PURCHASE OPTION.—According to *Modern Transport*, the option held by Mr. Hornsby, of United Automobile Services, Ltd., to purchase the Scarborough tramways has not been extended, and Scarborough Corporation's proposal to purchase them has also fallen through.

Walsall.—YEAR'S WORKING.—The accounts of the Corporation tramway undertaking (general manager and engineer: Mr. W. Vane Morland) for the year ended March 31st last show a total revenue of £49,729 and a total working expenditure of £35,025, leaving a gross profit of £14,704. The corresponding figures for the previous year were: Income, £57,607; working expenses, £39,696; gross profit, £17,911. To the gross profit was added an unemployment grant and bank interest making a total of £15,031 available. After deducting capital and other charges there was a net surplus of £2,824 as against £2,839 in 1928-29. The number of passengers carried fell from 9,152,128 to 8,281,767 and the car miles run from 762,281 to 653,088. The average total revenue per car mile increased from 18.180d. to 18.405d.

RAILLESS-CAR EXTENSIONS.—The Corporations of Walsall and Wolverhampton are shortly to commence a service of railless-cars between Walsall and Willenhall Market Place, and thence on the Wolverhampton Corporation railless-car route to Wolverhampton. The extension will cost £21,155.

West Hartlepool.—RAILLESS-CAR PROFITS.—The gross profit on the operation of the Corporation railless-car system last year was £12,105, with a net surplus of £3,156.

Telegraph and Telephone Notes.

China.—SHANGHAI.—The Chinese Telephone Subscribers' Association has warned the International Telegraph and Telephone Corporation that its purchase of the Shanghai system will result in a boycott. According to *The Times* an official of the Ministry of Communications states that the Government will never recognise the validity of any franchise granted to the Corporation by the International and French Concessions and announces that the Minister for Foreign Affairs is taking appropriate steps.

Northern Ireland.—TELEPHONY.—The cable ship *Alert*, which has been busy in Lochryan and off the Wigtownshire coast, is reported to be carrying out work in connection with an improved telephone extension to Northern Ireland. A new cable is to be laid from Glasgow to Ayr and an extension thence to Stranraer *via* Girvan. It is stated that an important development in transatlantic telephony is likely to be linked with this cable.

Rumania.—TELEPHONE CONCESSION.—The International Telephone & Telegraph Corporation has contracted with the Government to organise a Rumanian company to establish and operate a complete urban, inter-urban, rural, and international telephone service, including auxiliary services by wire, cable, and radio. According to the *Financial News* the concession follows the general lines of that granted in 1924 by the Spanish Government and relates to the entire public communication business of Rumania, other than telegraphy, for a minimum term of 20 years, at the end of which time the State may repurchase the whole plant on payment of cost and compensation, the latter diminishing progressively as the purchase date is postponed beyond that period. The contract further provides that the new company shall take over the existing plant at an appraised value, as well as the present employés. The programme covers the provision of modern rotary automatic service in all the principal cities of the country. With a population of over 17,000,000 and a telephone density of only 0.29 per 100 of inhabitants, the company points out that Rumania is a fruitful field for telephone expansion, when it is realised that the average telephone density of the remainder of Europe is 1.7 per 100, and in highly developed telephone countries, such as Denmark, is as high as 9.4 per 100.

South Africa.—AUTOMATIC TELEPHONY.—As was announced recently, the South African Post and Telegraph Authorities have made a contract for £750,000 with Siemens Bros. and the Automatic Telephone Manufacturing Co., Ltd., for the installation of automatic telephones throughout the Union. The contract provides for the installation of equipment in all the principal centres of the Union. It is spread over five years, and in dividing the orders for the plant between the two firms South Africa obtained advantageous financial terms. The Johannesburg and Cape Town installations will be the first to be undertaken. The Johannesburg equipment is to be delivered by March, 1931, and the construction work and change-over are to be completed by the following October. There will be a central exchange in McLaren Street with 6,500 lines, one at Hillbrow with 3,500 lines, and provision is to be made for four satellite exchanges. At Germiston the system is to be introduced by 1932, and it will be extended gradually from Springs to Randfontein. In the Cape Peninsula the first conversion is to be made by 1933, when the three centres of Cape Town, Central Woodstock, and Seapoint will command 15,900 lines. Others will follow, Rondebosch and Claremont in 1934, Muizenberg in 1935, and Wynberg in 1936. By the end of 1937 the automatic system will be in operation throughout the peninsula. Port Elizabeth already has an automatic exchange, and two satellites are to be opened, the contract specifying March, 1931, for delivery of the plant; by 1936 it is expected that a further exchange will be necessary. The East London exchange is to be completed within eighteen months, with 2,500 lines. Durban municipality owns the telephone undertaking there, but the Minister of Posts and Telegraphs is negotiating with the object of taking it over. The manufacturers mentioned have agreed to take eight South African apprentices for six months' training in England, so that their knowledge will be available when the installations are being made. An engineer from England has been in South Africa for some time in an advisory capacity. The subscribers' instrument to be used is the "Neophone."

Sweden.—TELEGRAPH BOARD'S REPORT.—The report of the Telegrafverket (Telegraph Board) for 1929 reflects the favourable economic situation of that year. The increase in the number of telephones (by 23,107 to 495,312) was the biggest increase since 1918. Telephone conversations with foreign countries increased by 27.5 per cent., compared with only 8.7 per cent. the previous year. The number of inland telegrams increased by 1.1 per cent. and that of telegrams to foreign countries by 2.3 per cent. At the end of 1929 there were 83 telephones per 1,000 inhabitants in Sweden, compared with 80 at the end of 1928, Stockholm leading with 305 per 1,000 inhabitants. Telegrafverket's earnings increased by Kr. 3,460,000 to Kr. 94,140,000 and its expenses by only Kr. 650,000 to Kr. 71,240,000, the net profit thus being Kr. 22,900,000, or 7.32 per cent. on the invested capital, against 6.57 per cent.

in 1928. The number of new telephone stations built was 118 and 44,000 kilometres of telephone wire was laid, the total cost being Kr. 10,800,000.—*Reuter's Trade Service* (Stockholm).

The Telephone Service.—HASTINGS EXCHANGE.—The new central-battery exchange equipment at Hastings, Sussex, was successfully brought into operation on July 14th. The plant, which was manufactured and installed by Standard Telephones and Cables, Ltd., has been designed to accommodate 3,600 lines initially with an ultimate capacity of 7,400 lines.

Transatlantic Telephony.—SOUTH AMERICA.—The British Postmaster-General announced on July 16th that the service had been extended in Mexico to Orizaba, Cordoba, and Vera Cruz, in the State of Vera Cruz.

Radio Notes.

Broadcasting House.—PROGRESS REPORT.—The B.B.C. states that satisfactory progress is being made with the construction of "Broadcasting House," its new headquarters in Portland Place, London. The excavations and foundations, together with a retaining-wall enclosing three floors below ground level, were completed last winter. In February last work was begun on the superstucture; the outer steel framework is well advanced, much concrete flooring has already been laid, and the central brick tower which is to contain the studios and their suites is taking shape; two studios below ground level have already been completed in the rough. A feature that has been given especial consideration is the lighting of the building, with secondary wiring for lighting the central tower in emergencies. In order to avoid any feeling of depression among those whose duties may confine them for long periods within the central tower, where artificial illumination only will be used, the scheme adopted for the corridors, staircases, and certain other parts of the interior is the introduction of artificial daylight through casement windows of the normal type. The ventilation system of the building is one of the most complicated of its kind ever undertaken.

Canada.—LICENCES.—The number of listeners' licences issued during the first two months of the current fiscal year was more than half the total for the whole of last year. The licences issued last year numbered 423,557; in the last two months they totalled 284,487. Of the new licences, 148,602 have been taken out in Ontario and 55,147 in Quebec, says *World-Radio*. Altogether the Canadian Government had issued 608 free licences to blind people up to May 31st this year.

France.—NEW STATION.—A new 12-kW transmitting station, located about 62 miles from Paris, is to be inaugurated shortly. The studios will be in Paris.

Italy.—LICENCES.—On June 1st, 1930, the number of listeners' licences issued had reached 137,160, an increase of 218 per cent. as compared with the number in use on January 1st, 1929.

VATICAN STATION.—The inauguration of this station is three weeks overdue; when test transmissions commence they will be on wavelengths of 50.26 and 19.84 metres.

LOUD-SPEAKERS.—The Governor of Rome has issued an order prohibiting the use of loud-speakers outside shops.

Licences.—PROSECUTIONS.—During the twelve months ended May 31st, 1930, the Post Office authorities initiated 1,029 prosecutions for the use of unlicensed receiving sets. Convictions were obtained in all but five cases.

Norway.—REORGANISATION.—An expenditure of £250,000 on new equipment, including transmitters, is involved in a reorganisation scheme under consideration.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Australia.—MELBOURNE.—Posts and Telegraphs Department. August 19th. Telephone jacks. (B.X. 6477.)*

August 5th. Telephone cable. (A.X. 9877.)* Testing instruments. (A.X. 9878.)*

SYDNEY.—August 18th. Municipal Council. A.c. consumers' meters. Specifications, &c., from the Construction Engineer, Electricity Department (deposit £1). Tenders to W. G. Layton, town clerk.

Bridlington.—August 9th. Town Council. 11-kV switchgear for the control sub-station. (July 11th.)

Canada. — REGINA (SASKATCHEWAN).—August 11th. City Council. Transformers and switchgear. (A.X. 9870.)*

Chile.—SANTIAGO.—July 29th. State Railways. Electric clocks. (B.X. 6472.)*

Crook.—July 31st. Electricity Department. Cables and sub-station. Also work in connection with overhead l.p. network. (July 11th.)

Dundee.—Corporation. Electric lighting installation at shops in Kinghorne Road. Particulars from Mr. Geo. Baxter, city engineer.

Egypt.—CAIRO.—July 26th. Ministry of the Interior. Supply and erection of a cooling tower for the electric power station at Assiout. (A.X. 9627.)*

September 9th. Diesel-driven generator. (A.X. 9873.)*

September 14th. Four electric air compressor sets. (A.X. 9886.)*

August 2nd. Electrical plant and material for the Suez power station. (A.X. 9822.)*

Farnworth.—July 23rd. Urban District Council. L.p. disconnecting boxes, frames and covers, and distribution pillars. (June 20th.)

Fleetwood.—July 25th. Electricity Department. E.h.p. switchgear, transformers, l.p. disconnecting pillars, &c. (See this issue.)

Glasgow.—July 26th. Clyde Navigation Trust. One 40-ton electric travelling coaling crane and six 5-ton semi-portal electric cranes for Glasgow Harbour. Specifications from Mr. D. Fife, mechanical engineer (deposit 3 guineas). Tenders to general manager and secretary, 16, Robertson Street, Glasgow.

Grantown-on-Spey.—Town Council. July 19th. Electric lighting at three blocks of houses. Plans and specifications from H. J. Fraser, architect. Tenders to town clerk.

Guildford.—Housing Committee. Wiring of 44 houses on the Shepherd's Hill housing estate. Particulars from J. W. Hipwood, Tunsgate, Guildford.

Halifax.—August 18th. Improvements Committee. Electrician's work required in erection of shops and offices (Bull Green development). Specifications (deposit £2 2s.) from A. C. Tipple, borough engineer, Crossley Street.

Hamilton.—Corporation. L.p. underground cables. (July 11th.)

Ilford.—August 11th. Electricity Department. Dismantling and removal of plant at Suffolk Road refuse destructor. (See this issue.)

India.—SIMLA.—August 4th. Indian Stores Department. Transmission line material. (A.X. 9857.)*

July 28th. Telephone cable. (A.X. 9833.)*

London.—CENTRAL ELECTRICITY BOARD.—July 28th. 132-kV transmission line crossing of the River Thames for the South-East England Electricity Scheme, 1927. (June 13th.)

Foundation works for 132-V transmission line towers over the River Thames near Dagenham. (June 27th.)

August 11th. 33-kV switchgear. (July 11th.)

LONDON COUNTY COUNCIL.—August 11th. Wiring and fitting buildings on Loughborough Road housing estate. (See this issue.)

Malling.—August 1st. Corporation. Electric lighting and heating at the Council's isolation hospital, East Malling.—Particulars from S. L. Bundy, High Street, West Malling.

Milford Haven.—August 8th. Electricity Department. Goods and materials, including meters, &c. (See this issue.)

New Zealand.—WELLINGTON.—Public Works Department. August 12th. 11-kV metal-clad switchgear and accessories for Mangahao. (B.X. 6455.)*

August 19th. Supply and delivery of three single-phase transformers for the Penrose sub-station. (B.X. 6427.)

Post and Telegraph Department. September 2nd. Telephone bells. (A.X. 9871.)*

September 9th. Resistance stools. (A.X. 9867.)*

DUNEDIN.—August 4th. Corporation Electricity Department. Three tons of cadmium copper trolley wire and four tons of hard drawn trolley wire. (A.X. 9785.)*

Omagh.—July 20th. Urban District Council. One 28-kW and one 56-kW heavy oil engine-driven alternators, l.p. switchboard, 3-ton hand-operated overhead travelling crane, underground and overhead mains. (July 4th.)

Salford.—August 2nd. Electricity Department. 33,000-V feeder between Frederick Road works and Trafford sub-station. (July 11th.)

South Africa.—JOHANNESBURG.—Railways and Harbours. July 28th. Twenty-eight electric lifts for the new railway building, Johannesburg. (A.X. 9623.)*

August 11th. Thirteen four-ton electrically-driven portal jib cranes for Table Bay Harbour. (B.X. 9683.)*

City Council. August 2nd. 3-phase truck-type switchboard panels. (A.X. 9811.)* 15 miles of copper trolley wire. (A.X. 9851.)* Bare and weatherproof copper wire. (A.X. 9857.)*

CAPE TOWN.—July 23rd. Electricity Department. Single and 3-phase motors and starters. (B.X. 6497.)*

DURBAN.—Railways and Harbours. One 80-ton fixed electric crane for Congella Wharf, Durban Harbour. (A.X. 9727.)

August 15th. Corporation. General Stores Department. Sixteen power transformers. (A.X. 9800.)*

UMTATA.—September 2nd. Municipal Council. Water turbo-alternator, transformer, pipe line and transmission line, together with suspension bridge and telpher gear. (A.X. 9874.)*

PORT ELIZABETH.—July 31st. Municipal Council. Transmission line material, cable, metal-clad switchgear, &c. (A.X. 9892.)*

Uruguay.—MONTEVIDEO. — July 31st. State Electricity Works. 84 three-phase, oil-cooled transformers. (A.X. 9768.)*

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.

Contracts Closed.

Barrow.—Town Council. Accepted :—
Four feeder pillars (£201).—W. T. Henley's Telegraph Works Co., Ltd.
Six transformers (£310).—English Electric Co., Ltd.
Stoker links.—Underfed Stoker Co., Ltd.
Extension of l.p. switchboard at Buccleuch Street Works (£677).—Metropolitan-Vickers Electrical Co., Ltd.

Bradford.—Education Committee. Recommended :—
Electric lighting at Swain House school (£355).—R. Crust.
Electricity Committee. Accepted :—
Automatic switchgear in connection with traction supplies. Metropolitan-Vickers Electrical Co., Ltd.; Bertram Thomas.
E.h.p. switchgear.—A. Reyrolle & Co., Ltd.
Two sets of bus-bar reactors.—British Thomson-Houston Co., Ltd.
Remote controlled induction testing transformer, &c.—English Electric Co., Ltd.
One 150-line telephone switchboard.—North British Engineering Equipment Co.

Dumfries.—Town Council. Accepted :—
Four-panel switchboard for Maxwelltown power station (£122).—New Switchgear Construction Co.

East Ham.—Cleansing Committee. Recommended :—
Electric vehicle for refuse collection (£971).—Electricars, Ltd.

Glasgow.—Corporation Electricity Committee. Recommended :—
Cables.—Enfield Cable Works, Ltd.; Callender's Cable and Construction Co., Ltd.; W. T. Glover & Co., Ltd.; Craigpark Electric Cable Co., Ltd.; Edison Swan Electric Co., Ltd.
Flexibles.—Craigpark Electric Cable Co., Ltd.
Meters.—Ferranti, Ltd.; Chamberlain & Hookham, Ltd.; Edison Swan Electric Co., Ltd.; Metropolitan-Vickers Electrical Co., Ltd.
Electric cookers.—Falkirk Iron Co., Ltd.; Siemens Electric Lamps & Supplies, Ltd.
Electric kettles.—Bulpitt & Sons, Ltd.
Cast-iron boxes, section pillars, &c.—Carron Company; Falkirk Iron Co., Ltd.; Lion Foundry Co., Ltd.; McCallum & Hope, Ltd.; McDowall, Steven & Co., Ltd.; Mitchell, Russell & Co., Ltd.; Robert Taylor and Co.
Transport Committee. Recommended :—
Trolley feeder cable.—Craigpark Electric Cable Co., Ltd.
Pinkston power station plant.—Feed water heaters.—G. & J. Weir, Ltd.; Metropolitan-Vickers Electrical Co., Ltd.
Steam piping.—Foster Bros., Ltd.
Boiler feed, &c., piping.—James Combe & Son, Ltd.
Valves.—Feed water and drain.—J. Shaw, Son, and Greenhalgh, Ltd.
Reducing valves.—Hopkinsons, Ltd.

Hastings.—Water Committee. Recommended :—
Electric water level recorder (£123).—Glenfield & Kennedy, Ltd.

Kippax.—Education Committee. Accepted :—
Electric lighting at the Council school (£148).—P. Green.

London.—HAMMERSMITH.—Electricity Committee :—
E.h.p. switchgear.—

	£
SWITCHGEAR & COWANS, LTD. (Recommended)	820
Ferguson & Pailin, Ltd.	910
General Electric Co., Ltd.	939
A. Reyrolle & Co., Ltd.	1,012

Portsmouth.—Electricity Committee. Accepted :—
H.p. cable.—Johnson & Phillips, Ltd. (£2,670); District Transmission Lines, Ltd. (£514); Hackbridge Cable Co., Ltd. (£184).
Guildhall Committee. Recommended :—
Electrification of lifts at Guildhall (£557).—Medway's Safety Lift Co., Ltd.

Notes.

Fatigue Limits of Steels in Water.

Studies of the effect of corrosion-fatigue damage in a considerable variety of steels show, according to *Power*, that the rate of damage is little affected by chemical content or physical properties.

The following table shows values for a variety of materials. It will be seen that Monel metal and, in general, copper-nickel materials, do not lose much by the presence of water, and also that a change from fresh to salt water makes little difference.

The corrosion-fatigue limit given in the table is an indication of durability. It can be used as a guide in design.

FATIGUE LIMITS FOR VARIOUS MATERIALS.

Material.	Tensile strength lb. per sq. in.	Rotative cantilever test.— Endurance limit, air, lb. per sq. in.	Corrosion-fatigue limit, lb. per sq. in. Fresh water.	Salt water.
0.16 per cent. carbon steel	52,000	25,500	17,500	6,000
0.24 per cent. carbon steel	55,600	24,000	17,000	——
1.09 per cent. carbon steel	103,400	42,000	21,000	8,000
3.7 per cent. nickel steel	130,400	62,000	22,000	8,000
Monel metal	127,200	52,000	23,000	26,000
Monel metal	81,900	36,000	24,000	26,000
Duralumin	54,600	11,000 to 13,000	7,000 to 9,000	6,000 to 8,000
Stainless steel	178,000	88,000	32,000	——
Stainless steel	117,400	53,000	37,500	27,000
Stainless steel	94,400	52,000	36,000	36,000

These particular materials probably form real protective films which cause them to have practically the same strength in water as in air. This indicates, in the writer's opinion, that Monel metal and stainless steels would be good materials to use for boiler drums if they were not so expensive.

However, if steel boiler plate is used the design should be such as to avoid any possibility of areas of stress concentration in the presence of water. Bending action, due to changes in temperature from any cause, should be avoided.

Safe water should be used, and it should be as free from air as possible.

A Hydro-electric Auxiliary Station.

In regard to the description given in our last issue of the plant at Niederwartha power station near Dresden, we are informed by Messrs. Perrins, Ltd., that two of the sets referred to were supplied by Messrs J. M. Voith, of Heidenheim, and two by Messrs. Escher Wyss & Co.

The pumps designed by Messrs. J. M. Voith, in co-operation with Messrs. Sulzer Bros., were of the single-stage type, the others being double stage. On the completion of this station Messrs. J. M. Voith received an order for the 36,000 h.p. (maximum) pumps at the Herdecke power station; these are said to be the largest pumps in the world.

The N.P.L. Report.

Our readers are reminded that, in order to make the results of the research work carried out at the National Physical Laboratory more readily accessible to the public, the annual report of the Laboratory for 1929 (see ELEC. REV. June 13th and July 4th, 1930) has been published as a number of separate pamphlets as well as in a single volume form. The pamphlets are on sale at H.M. Stationery Office, the price of that dealing with the Electricity Department being 3s. 6d. net.

Educational.

Courses of study are provided in civil, mechanical, and electrical engineering, metallurgy, &c., at the University College of Swansea. (See advertisement in this issue.)

Ludgate Circus Traffic Control.

An experimental three-light system for the control of the traffic at Ludgate Circus was put into operation last Saturday, and has so far proved satisfactory. Upon the results of the experiment rests the decision whether the system shall be introduced at other congested cross-roads in the City of London.

Turbo-electric Ships.

After completing her official trials the s.s. *Musa*, a turbo-electric vessel built to the order of Messrs. Elders and Fyffes by Messrs. Workman, Clark for passenger and fruit-carrying service between Central America, West Indies, Europe, and the American seaboard, sailed for America on July 12th. She is of 5,833 tons gross and 2,974 net register. Messrs. Workman, Clark have also lately rebuilt the fruit company's *Darien* at their yard, which vessel, after having been lengthened by 27 ft. 6 in., has been fitted with turbo-electric machinery of generally similar type to that fitted on the *Musa*, but with steam generated in water-tube boilers. *The Times* also announces that Messrs. Vickers Armstrong, Ltd., have received an order for a passenger ship for the Union Steamship Co., of New Zealand. The ship will be built at Barrow-in-Furness, and the main propulsion turbo-electric unit will be supplied by the British Thomson-Houston Co., Rugby, in collaboration with Vickers Armstrong, Ltd.

Of the two new turbo-electric liners *Morro Castle* and *Oriente*, which are to take their places in the Ward Co.'s service from New York to Havana shortly, the former is scheduled to sail on her maiden voyage on August 23rd. Built at Newport News, Virginia, U.S.A., by the Newport News Shipbuilding & Dry Dock Co., they are twin-screw oil-burning ships 508 ft. in length and of 70 ft. 9 in. beam.

Members of the Western Centre of the I.E.E. at Sedbury Park Hotel. Summer Meeting, 1930.

Appointments Vacant.

Electrical engineer for Derby Corporation.

Mains superintendent for Scarborough Electricity Department.

Fitter-driver for Severalls Mental Hospital, Colchester.

Foreman overhead linesman for Nigerian Government Public Works Department.

Evening teacher in electrical engineering for Goldsmiths' College, New Cross.

Junior mains assistant for Bermondsey Electricity Department.

(See our advertisement pages to-day).

Powerton Generating Station, Illinois.

For December, 1929, with two 55,000-kW units in continuous operation, the Powerton station of the Super-Power Company of Illinois, U.S.A., is reported by *Power* to have shown the remarkable average economy indicated by 12,445 B.th.u. per kWh sent out. Performance for the next three months closely approximated to this, making an average for the four months of 12,546 B.th.u. This excellent performance was obtained from a 600-lb/sq. in. 725-deg. F. pulverised-fuel station operating for December on a capacity factor of 72.7 per cent., or an operating load factor of 59 per cent., based upon the maximum output. The fuel used had a calorific value of 10,045 B.th.u. per lb., as received, containing 15 per cent. ash, 12.5 per cent. mine moisture, and 3 to 4 per cent. sulphur. The consumption of coal was 1.24 lb. per kilowatt-hour.

Each of the two turbine-generators now in operation consists of a tandem-compound turbine driving on the same shaft a 52,500-kW, 22,000-volt main generator, and a 2,500-kW, 2,300-volt auxiliary house generator. Each generator has a direct-connected exciter. Stand-by auxiliary service is supplied by transformers tapped to the main bus. The high-pressure element of the turbine has fourteen stages and the low-pressure machine twelve stages. As the water rate is 8.5 lb. per kilowatt-hour for the turbine and the four steam extractions, only 0.91 sq. ft. of surface per kilowatt has been provided in a single-pass, horizontal, divided-waterbox condenser that is connected to the turbine by a water-sealed expansion joint.

Each turbine is served by two standard cross-drum boilers and one reheat boiler, with interconnection between the units so that the load may be equally divided between the standard boilers, which are arranged three on either side of a central firing aisle. Each boiler will deliver, at maximum capacity, 275,000 lb. of steam per hour, while the reheat boiler, with less than one-third of the heating surface, has a steaming capacity of 140,000 lb. per hour.

With the boilers set high, liberal furnace volumes were provided. At full steaming capacity the heat release approximates 28,000 B.th.u. per cubic foot. Water-cooled surface aggregating 2,900 sq. ft., covered by refractory blocks, protects the furnace walls on all sides, including the hopper bottom ash pits. From the pits the ashes drop into a sluicing line and are flushed into an open pit outside the plant. The pulverising and fuel-feeding equipments are in the central aisle between the two rows of boilers. The mill feeders and exhausters are on the operating floor, and the mills in a sealed basement. There are two air-separation ball-and-pusher mills per boiler, one exhauster per mill, and two burners per exhauster, making a total of four burners per furnace, all of the Calumet turbulent-flare type, in which the fuel passes between vertical tubes. Water-cooling surface is limited to the furnace walls, so that the slag remains molten. In passing down through a spray of water, the molten slag is chilled and shattered, so it may be sluiced away to the pit serving the boilers. The furnace volume is 13,900 cu. ft.

As the mill feeders had proved to be reliable in service, duplicate feeders were eliminated in the second unit. Mills of the same type, but of later design, were used, and horizontal cross-tube burders were adopted.

As at the State Line and other recent stations, the output switching arrangements are installed out-of-doors, the power house containing only the generating equipment and auxiliary apparatus. The main 22,000-volt busbars, the oil circuit breakers, and the metal-clad switchgear are in the outdoor switch yard. Three distinct outdoor sub-stations, all fed from the main bus, step the voltage up to 33,000, 66,000, and 132,000 volts to meet normal transmission-line requirements of the four companies purchasing the electrical energy. All auxiliary switching equipment is of the air-insulated metal-clad type, operating at 2,300 volts reduced from the generating voltage of 22,000. The entire 2,300-volt system is interconnected and sectionalised.

The first unit went into service in September, 1928, and the second unit during August, 1929. Work is now in progress for the installation of two additional units, each of 105,000 kW. It is anticipated that the third unit may be ready for service by January, 1931, and the fourth during August of the same year.

Each of the two 105,000-kW units in the second section of the station will have a three-barrel tandem-compound turbine to drive a single generator with direct-connected exciter. The auxiliary house generator will be omitted from the main shaft for two reasons: first, to reduce the over-all length of the unit, and, secondly, because it was considered safe to take the station auxiliary power supply from the main bus, for as the station adds capacity the risk of total breakdown diminishes.

Impressions of the World Power Conference.

An informal monthly luncheon of the British Engineers' Association was held on July 10th at the Hotel Victoria, Northumberland Avenue, London, W.C. The president, Sir Gilbert C. Vyle, was in the chair, and about 70 representatives of member firms and guests were present. Mr. D. A. Bremner, O.B.E., director of the Association, who attended the second World Power Conference in Berlin as an official British delegate, gave some impressions of the meeting. After a sympathetic reference to the health of Mr. D. N. Dunlop, the originator of the Conference, Mr. Bremner stated that of the 3,900 registered members from 48 countries the biggest national quota was provided by Great Britain with 237 delegates; Japan came second with 188 and was followed by the U.S.A. with 162. The number of papers sent in from this country (46) was less than those presented by the U.S.A. and Germany.

Mr. Bremner expressed enthusiasm for the thorough manner in which Germany, as the host country, had mobilised its resources to make the Conference a success and to provide for the comfort and entertainment of the visitors in every detail. His information showed that the German Government had spent £73,000 towards the expenses of the Conference, while all sections had supported it handsomely. He instanced the publications issued in two or more languages describing features of technical interest in Germany and the lavish hospitality received everywhere. The tendency of the proceedings had been towards the consideration of results achieved and their economic bearing on the future. This was as it should be, since technical achievements were but a means to an end and the ultimate test was their economic value.

While there was superficially every sign of prosperity in Berlin, there was no doubt at all that Germany was passing through a very difficult time. The Machinery Makers' Association of Germany corresponded to the B.E.A. in this country, and represented 2,250 constituent firms. In 1929 only 67 per cent. of the possible man-hours had been worked and about 60 per cent. of the productive capacity had been utilised, a figure approximating to that obtaining here.

Mr. Bremner concluded by observing that the human spirit was of greater importance to civilisation than material factors. It was quite evident that the spirit of patriotism which was vital to national development was still alive in Germany.

Institution of Electrical Engineers.

COUNCIL ELECTIONS.—Scrutineers have reported the result of the ballot for Council appointments to fill vacancies which will occur in September next to be the election of all the Council's nominees (see ELEC. REV., June 13th, 1930, page 1117) with one exception, namely, the election of Mr. V. Watlington in place of Mr. W. Riggs.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

Mr. G. H. Lake, electrical engineer of Derby, was last week appointed city electrical engineer of Nottingham by the City Council upon the Electricity Committee's recommendation. He succeeds Mr. H. Talbot, who is retiring after over 40 years' service with the Corporation.

Mr. A. J. Hutchinson, the Council's electrical engineer to the Farnworth U.D.C., has been granted permission to act in an advisory capacity to the Westhoughton Council on certain proposals.

Lt.-Col. W. A. Vignoles and **Mr. H. T. Young** returned home from their visit to the United States on Friday last week. Our illustrations are reproduced from photographs taken upon their arrival at Euston. The purpose of their visit, which coincided with the holding of the annual N.E.L.A. Convention at San Francisco, was to study the policy of electricity supply undertakings in the United States, with particular reference to their relations with the public, and the electrification of American industry and homes.

Mr. Rutherford, contract manager to the Hull Telephone Department, has retired after 26 years' service. At a recent gathering he was presented with a radio set by the staff.

Mr. H. Whittle, of the Monmouth Electricity Co., has been appointed borough electrical engineer of Brecon. Mr. Whittle was borough electrical engineer of Monmouth when the undertaking was transferred to the company. There were 136 applicants for the post.

Mr. K. C. Brangwin, lighting engineer, East Midland area, to the Benjamin Electric, Ltd., has secured the position of amateur quarter-mile champion by defeating the previous holder of the championship at Stamford Bridge on July 5th.

Mr. A. N. Phillips, of the Ebbw Vale Power Co., has been appointed by the Torquay Town Council as assistant mains engineer in the development of the Ashburton and Buckfastleigh area.

Lieut.-Col. W. A. Vignoles, D.S.O., and Mr. H. T. Young, with their wives, at Euston upon their return from America.

Mr. D. Johnstone Sinclair has been appointed a director of the Automatic Telephone Manufacturing Co., Ltd., and the International Automatic Telephone Co., Ltd.

Mr. Theodor Petersen, one of the joint managers of Callender's Cable & Construction Co., Ltd., who has been with the company for 35 years, has been appointed assistant managing director of the company with a seat on the board.

Mr. A. G. Snell, who for the past three years has acted in the capacity of works manager of Messrs. H. E. Ashdown (Birmingham), Ltd., has been appointed a director.

Mr. James W. McKay, who has been general secretary of the Electrical Wholesalers' Federation for the last four or five years, has resigned that position and has asked the Council to relieve him of his duties as soon as possible. We understand that the Council has accepted his resignation with great regret and expressed its appreciation of his services to the Federation.

Mr. W. J. Smithers, borough electrical engineer of Dorchester has had his salary increased by £25 per annum.

Mr. Bennett, who has for the past seven years been with the Strathpeffer and Dingwall Electric Co., and the Rossshire Electric Supply Co., has secured an appointment with the Pirelli-General Cable Works, Ltd., and he has been presented with a gold wristlet watch together with a cut glass silver-mounted scent spray for his wife.

Obituary.

Mr. J. P. Clark.—We regret to record the death, on July 14th, of Mr. J. P. Clark, one of the senior engineers of the Marconi Company. Mr. Clark was educated at Faraday House, and after being engaged for some years in electrical engineering in Yorkshire, he joined the Marconi Company in 1913. For a number of years past Mr. Clark had been chief of one of the contract sections in the Engineering Department of Marconi House, and was responsible for the provision of the plant and supplies to many of the largest radio-telegraph stations in all parts of the world, particularly the Beam stations. His death took place suddenly, while he was on holiday, and came as a great shock to his many friends in Marconi House where he was held in very great esteem.

Mr. G. C. Dobson.—The death occurred recently, at the age of 51, of Mr. G. C. Dobson, who was legal draftsman to the Electricity Commissioners. He was a nephew of the late Austin Dobson.

Mr. H. Cook.—We regret to record the death of Mr. H. Cook, which occurred at Wrexham on July 7th. Commencing his career with the Whitehaven Corporation, Mr. Cook was for some years on the staffs of the Tynemouth Corporation, and the Yorkshire Electric Power Co. For the past two years he had been associated with Electricity Distribution of North Wales and District, Ltd., as district engineer.

Mr. J. E. Rivenhall.—The death recently occurred at Eastbourne of Mr. J. E. Rivenhall, who was for many years associated with Vickers, Ltd., and other leading firms as an electrical engineer. He was fifty-seven years of age.

Will.—*The Times* reports that the late Mr. W. H. B. BARNETT, medical electrician, left £8,941 (£8,716 net personalty).

Financial Section.

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies' Dividend Changes, Transactions in Stocks and Shares.

New Companies Registered.

Venus Radio & Electrical Co., Ltd.—Private company. Registered July 5th. Capital, £1,000 in £1 shares. Objects: To carry on the business of radio, electrical and general engineers, &c. The directors are: A. Abbey, Elderleigh, Rastrick, nr. Huddersfield; J. T. Thornton, 73, Birkby Lodge Road, Huddersfield. Registered office: 1, Lord Street, Huddersfield.

Sydney R. Hare & Son, Ltd.—Private company. Registered July 5th. Capital, £3,000 in £1 shares. Objects: To acquire the business of an electrical engineer, formerly carried on by the late S. R. Hare at Union Chambers, Temple Row, Birmingham. The first directors are: Edith Mary Hare and P. S. Hare, electrical engineer, Rushall Hall, Walsall; R. H. Rogers, 185, Lee Bank Road, Birmingham, electrician. Registered office: Union Chambers, Temple Row, Birmingham.

British Automatic Conveyor & Equipment Co., Ltd.—Private company. Registered July 3rd. Capital, £1,000 in £1 shares. Objects: To carry on the business of electrical, motor and general engineers, mechanical engineers, &c. The directors are: S. A. Screeton, Ridgelands, Blyth Road, Bromley, Kent; G. H. Henfrey, 7, Cardigan Road, Barnes, S.W.13; A. H. Smith, 6, Nylands Avenue, Kew Gardens, Surrey. Secretary: A. H. Smith.

H. A. Wootton & Co., Ltd.—Private company. Registered July 11th. Capital, £7,500 in £1 shares. Objects: To acquire the business of a manufacturing, mechanical and electrical engineer carried on by H. A. Wootton at Stanley House, St. Chad's Place, King's Cross, as "H. A. Wootton & Company." The provisional directors are: H. A. Wootton, "Perth," Woodberry Way, N. Finchley, N.12, electrical engineer; Constance A. Smith, 2, Lansdowne Road, Muswell Hill, N.10, secretary. Solicitors: C. Robinson & Son, Hounslow.

Beresfords (Electrical), Ltd.—Private company. Registered June 21st. Capital, £600 in £1 shares (400 participating preference and 200 ordinary). Objects: To carry on business as electrical contractors and electrical engineers, manufacturers of and dealers in electric lighting, cooking, heating and electrical fittings and equipment of all kinds, &c. The subscribers (each with one share) are: W. H. Beresford, 181, Shaftesbury Avenue, W.C.2, electrical engineer; Mrs. Maud Beresford, 32, New Street, S.E.17. W. H. Beresford is the first director.

Martin & Newman (Birmingham), Ltd.—Private company. Registered July 11th. Capital £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in instruments for receiving or transmitting sounds and signals by telephony or telegraphy, &c. The directors are: G. H. Martin, 99, Pershore Road, Birmingham; R. W. Newman, 1152, Pershore Road, Birmingham. Registered office: 1154, Pershore Road, Birmingham.

Birka Regulator Co., Ltd.—Private company. Registered July 10th. Capital, £30,000 in 25,000 10 per cent. participating preferred ordinary shares of £1 each and 100,000 ordinary shares of 1s. each. Objects: To acquire the benefit of an option to take a licence to use certain patents for air and other regulators, to acquire the benefit of the trade mark "Birka," to adopt an agreement with D. F. Campbell and W. S. Gifford, and to carry on the business of contractors, builders, civil, electrical, and constructional engineers, &c. The subscribers are: W. S. Gifford, 231, Cromwell Road, S.W.5, and D. F. Campbell, St. Mary's House, Weybridge, engineers. Registered office: 17, Victoria Street, Westminster, S.W.1.

Watliff Co., Ltd.—Private company. Registered July 10th. Capital, £4,000 in £1 shares. Objects: To acquire the business of mechanical and electrical engineers carried on by A. O. Hinchliff and S. J. Watson at 175, Merton Road, S.W.19, as the Watliff Company, together with trade mark No. 424,476, and to carry on the said business and that of electricians, engineers, motor engineers, contractors, suppliers of electricity, &c. The first directors are: S. J. Watson, 52, Fishponds Road, Upper Tooting, S.W., engineer; A. O. Hinchliff, "Temsee," River Mount, Walton-on-Thames, engineer; W. M. Hume, 5, Euston Grove, Birkenhead, Ches., C.A. Solicitors: Savery, Stevens & Nutt, 32, Great St. Helens, E.C.

George Franklin Co., Ltd.—Private company. Registered July 5th. Capital, £1,000 in £1 shares. Objects: To manufacture and deal in all kinds of electrical appliances including electric fires, wireless sets and appliances, &c. The first directors are: G. M. R. Franklin, 92, Westminster Road, Handsworth, Birmingham, metalwork designer: J. M. Phelps, Windy Ridge, Vicarage Road, Harborne, Birmingham, accountant's clerk. Registered office: 46, Cherry Street, Birmingham.

Eons Electrical Co., Ltd.—Private company. Registered July 11th. Capital £500 in £1 shares. Objects: To carry on the business of electricians, mechanical engineers, &c. The directors are: F. A. Pike, 16, Bath Road, Bedford Park, W.4, electrical engineer; Hilda M. Wicks, 14, Wilson Street, Derby. Secretary: F. A. Pike. Registered office: 1, Bedford Corner, South Parade, Bedford Park, W.4.

Bell Electric Lamp Co., Ltd.—Private company. Registered July 9th. Capital, £500 in £1 shares. Objects: To carry on business as electrical accessory manufacturers, agents, importers, exporters, wholesalers, retailers, factors, and merchants, &c. The directors are: Isabella Bloom, clerk, and H. Bloom, electrical factor, both of 15, Highbury Quadrant, N.5. Registered office: Wingo House, 25, Norton Folgate, E.1.

Official Returns of Electrical Companies.

Wickford & District Electricity Supply Co., Ltd.—Capital, £10,000 in 1,500 preference and 8,500 ordinary shares of £1 each. Return dated November 6th, 1929 (filed January 3rd, 1930). All shares taken up. £9,995 paid. £5 considered as paid. Mortgages and charges, nil.

Loch Leven Electricity Supply Co., Ltd.—Capital, £10,000 in £10 shares. Return dated March 31st, 1930. 500 shares taken up. £5,000 paid. Mortgages and charges, nil.

English Cable Supplies, Ltd.—Capital, £2,500 in £1 shares. Return dated December 31st, 1929 (filed April 19th, 1930). 570 shares taken up. £570 paid. Mortgages and charges, nil.

West Wales Electric, Ltd.—Capital, £500 in £1 shares. Return dated October 14th, 1929 (filed April 5th, 1930). 450 shares taken up. £450 paid. Mortgages and charges, nil.

Electric Cables, Ltd.—Capital, £2,000 in £1 shares. Return dated December 31st, 1929. 1,000 shares taken up. £1,000 paid. Mortgages and charges, nil.

Cambridge Electric Supply Co., Ltd.—Capital, £400,000 in £1 shares. Return dated April 16th, 1930. All shares taken up. £295,000 paid (being £1 per share on 260,000 and 5s. per share on 140,000 shares). Mortgages and charges, £30,000.

Schall & Son, Ltd.—Capital, £20,000 in 9,000 preference and 11,000 ordinary shares of £1. Return dated December 25th, 1929. 9,102 ordinary and 5,000 preference shares taken up. £502 paid. £13,600 considered as paid. Mortgages and charges, £12,000.

British Insulated Cables (S.A.), Ltd.—Capital, £2,000 in £1 shares. Return dated March 24th, 1930. All shares taken up. £2,000 paid. Mortgages and charges, nil.

Electrical Distribution of Yorkshire, Ltd.—Capital, £1,500,000 in £1 shares. Return dated March 18th, 1930. 1,400,000 shares taken up. £1,400,000 paid. Mortgages and charges, nil.

Amesbury Electric Light & General Supply Co., Ltd.—Capital, £5,000 in £1 shares. Return dated September 23rd, 1929. All shares taken up. £5,000 paid. Mortgages and charges, £3,500.

Bartrum Roylance & Co., Ltd.—Capital, £5,000 in £1 shares. Return dated December 3rd, 1929. All shares taken up. £2,500 paid. Mortgages and charges, £1,181 5s. 4d.

Drake & Gorham, Ltd.—Mortgage dated June 18th, 1930, to secure £13,350, charged on 41, Factory Chase Estate, Park Royal. Holders: Allnatt, Ltd., Earley Station, Berks.

Seaton & District Electric Light Co., Ltd.—Capital, £10,000 in £1 shares. Return dated March 30th, 1930. All shares taken up. £10,000 paid. Mortgages and charges, £6,000.

Halcyon Wireless, Ltd.—Satisfaction in full on June 27th, 1930, of debenture authorised November 26th, 1928, and registered November 29th, 1928, securing £10,000. Debenture charged on property at 27a, Pembridge Villas, W., Ryder Street, Birmingham, and 72, Newman Street, Marylebone, and the company's undertaking and property, present and future, including uncalled capital, dated June 25th, 1930, to secure all moneys due or to become due from the company to Lloyd's Bank, Ltd.

Britain's Best Crystal, Ltd.—Mortgage for £1,200 and charge for £100, both dated May 25th, 1927, charged on 28, Springfield Road, Kingston-on-Thames (being property acquired by the company on June 20th, 1930). Registered pursuant to Section 81 of the Companies Act, 1929. Mortgagees: G. W. Joyce and W. A. C. Boodle, solicitors; and W. S. Cox, all of Kingston-on-Thames.

Electro Plant, Ltd.—Capital, £1,000 in £1 shares. Return dated December 31st, 1929 (filed March 27th, 1930). Two shares taken up. £2 paid. Mortgages and charges, nil.

W. Skewes & Co., Ltd.—Capital, £1,000 in £1 shares. Return dated April 2nd, 1930. All shares taken up. £650 paid. £350 considered as paid. Mortgages and charges, nil.

Automatic Rectifiers, Ltd.—F. T. Smith, of Premier House, 150, Southampton Row, W.C.1, was appointed receiver and manager on June 27th, 1930, under powers contained in first mortgage debenture dated May 22nd, 1928.

West Witton Electric Supply Co., Ltd.—Capital, £1,000 in £1 shares. Return dated March 18th, 1930. 885 shares taken up. £885 paid. Mortgages and charges, nil.

City Notes.

Marconi's Wireless Telegraph Co., Ltd.

The accounts of this company were abstracted in our last issue, p. 71, and the annual meeting was held on July 14th. Lord Inverforth (chairman), who presided, said that notwithstanding the acute, world-wide trade depression, a substantially greater value of orders was received in 1929 than in 1928. Work on hand in respect of contracts uncompleted at December 31st last showed an increase of £380,964, as compared with the previous year. Referring to the Cables and Wireless merger and the directors' advice to shareholders to exchange into the merger, the chairman said to have acted otherwise might have involved the Marconi Company in being confronted with joint competition on the part of the Government and the cable companies acting together. As a result of the merger, they had parted with the whole of their communications assets in telegraph companies and were now exclusively concerned with the non-traffic side of wireless. Regarding the research and development departments, many refinements and improvements in beam telegraphy had been made, and rapid strides had also been made in radio-telephony. They had recently installed a short-wave telephone circuit between Rome and Sardinia, which was remarkable for the development of wave lengths of less than 10 metres. Development of facsimile apparatus continued, and complete sets were now in course of installation in South Africa and Canada, and practical tests would be made with England during the next few weeks. With the introduction of night flying, a special receiving aerial system for use at ground stations, known as the Marconi-Adcock system, had been successfully demonstrated to representatives of the Admiralty, the Air Ministry, and the Post Office; this eliminated the night effects that gave rise to unreliability of bearings during darkness. They had equipped the Croydon Aerodrome for the Air Ministry with the most modern wireless installation of any air port in the world, and all Imperial Airway passenger-carrying aeroplanes were equipped with Marconi wireless apparatus. They had also developed, in collaboration with their associated companies, a ground organisation for attending to the maintenance and repair of wireless apparatus on aeroplanes travelling on the Continent. Marconi aircraft apparatus was in regular use in 19 countries outside Great Britain. All avenues were being explored for co-operating with the cables side of Imperial and International Communications, Ltd., on submarine cable research, and cable regenerator methods were now being tested on beam receiver circuits. The sales for the first six months of the current year had exceeded the record figures for 1929. The report and accounts were adopted.

Mexican Light & Power Co., Ltd.

The annual meetings of the Mexican Light & Power Co., Ltd., and the Mexican Tramways Co., were held in Toronto, Canada, on July 2nd, Mr. Miller Lash presiding. Referring to the finances of the Light & Power Co., the chairman said that for some time it had become apparent that the necessary capital expenditure of the company would call for the provision of a substantial amount, probably about $5,000,000, chiefly in connection with the new Lerma hydro-electric development, which was in course of completion, the purchase of the light and power business in the city of Toluca, and the purchase of the Gante office buildings. An arrangement had been concluded with Sofina under which it undertook to make advances to the company up to $5,000,000 as and when required or before the end of 1933, interest on any sums so advanced being payable at the rate of 7½ per cent. per annum. They undertook to issue to Sofina at par 7½ per cent. general unsecured bonds. Turning to the financial arrangements of the Tramways Co., he said that although the gross earnings were decreasing further expenditure was necessary on the tramway system and 8 per cent. first mortgage bonds amounting to nearly $3,000,000 would mature for payment on December 31st, 1931. Another arrangement was therefore concluded with Sofina under which it agreed to make the necessary advances at 7½ per cent. per annum until December 31st, 1933, on the terms that the amount so advanced should be liquidated at the end of 1933 by the sale to Sofina at $90 per share of a sufficient number of the ordinary shares of the Mexican Light & Power Co. owned by the Tramways Co., an operation which would call for approximately 33,000 shares. Sofina was also given the option to purchase at the same price approximately an additional 4,000 ordinary shares. The report and accounts were adopted.

Cable Companies' Meetings.

The annual meetings of the Eastern Extension, Australasia and China Telegraph Co., Eastern Telegraph Co., and Western Telegraph Co., were held on July 14th. Mr. J. C. Denison-Pender, who presided at each of the meetings, said that Cables and Wireless, Ltd., now held 99.58 per cent. of the ordinary stock of the Eastern Telegraph Co., 99.7 per cent. of that of the Eastern Extension Co., and 99.69 per cent. of that of the Western Company. The plan provided for the transfer of

the communications assets of the companies to Imperial and International Communications, Ltd., and the Eastern Company had received in exchange 10,626,601 fully paid £1 shares in the Communications Company; the Eastern Extension Company had received 6,533,050, and the Western Company 4,724,845 of such shares. In order to provide their quota of funds for the purchase of the Imperial Cables and the Pacific Cable Board's undertakings, the Eastern Company had purchased for cash a further 552,954 shares in the Communications Company, the Eastern Extension Company a further 287,957 shares, and the Western Company a further 239,333 shares.

Aluminium Corporation, Ltd.

The report for the year ended December 31st, 1929, states that during the year (as from May 6th, 1929) the scheme of reorganisation came into operation. In a revised balance sheet it is shown that the works and plant have been written down to accord with the new valuations, and the debit balance on the profit and loss account has been written off. The liability under first debentures is reduced to £200,000, while the "B" and "C" debenture loans, and other items, have been extinguished.

Presiding at the annual meeting on July 10th, Mr. S. G. Bibby said that the financial position had been greatly strengthened by the reorganisation which took place in May last. Arrangements had been concluded for improving the works at Dolgarrog, and new plant and machinery had already been ordered. The work would not be completed until late in the autumn, and the full benefit of the increased capacity could not be realised during the current working year. Commodity prices had persistently fallen in the world's markets, and had now reached an abnormally low level. With a return to normal conditions, however, he thought they ought to secure their fair share of prosperity. The report and accounts were adopted.

Dubilier Condenser Co. (1925), Ltd.

The report for the year ended March 31st last shows a loss of £3,914, as compared with a profit of £11,046 in the preceding year. The amount brought forward from the previous year was £11,052, and after deducting the preference dividend for the half-year to November 30th, 1929, a balance of £1,138 is carried forward. The annual meeting was held on July 8th. Sir A. Lowes Dickinson, who presided, said that the trading for the first nine months of the year showed an increase in sales of nearly 20 per cent. As this increased business was done in face of intense competition, prices had to be severely cut, but notwithstanding this, the total net profit was slightly in excess of the preceding year's. The trade in January was disappointing, and in the following two months the company felt the full force of the acute depression which had so seriously affected the whole country. Business done during the three months to March 31st last fell 28 per cent. below that of the previous year, and the result was a loss of nearly £4,000 for the year. The Sales Department had been reorganised and a new sales manager had been appointed. The company had a well-equipped factory and a thoroughly competent scientific and general staff. Several proposals for expansion of the business or amalgamation with complementary businesses of the same nature had been discussed, but so far nothing that could be recommended to the shareholders had been offered. The report and accounts were adopted.

Parkinson & Cowan, Ltd.

At the recent annual meeting the chairman (Sir Henry Cowan), referring to the company's subsidiaries, said that the most recently established one—Domestic Electrification, Ltd.—was still in process of development. It had already placed on the market a full range of electric fires and its products also included electric cookers, water heaters, an automatic electric iron, and other appliances. On the same day the shareholders approved the increasing of the company's capital to £1,500,000 by the creation of 200,000 preference and 300,000 ordinary shares of £1 each.

A prospectus was issued by the company on July 10th offering for subscription 121,573 7 per cent. cumulative preference shares of £1 each, at 21s. per share, and 150,000 £1 ordinary shares at 25s. per share. The prospectus showed that the company controls twelve subsidiaries, including Domestic Electrification, Ltd. (mentioned above), Measurement, Ltd., and the Electricity Meter Manufacturing Co., Ltd. For the last four years the ordinary dividend has been 10 per cent. It was stated that the proceeds of the issue were required for the development and expansion of the company's electrical and other subsidiaries, to provide funds to purchase the preference shares of the Parkinson Stove Co., Ltd., and for the general purposes of the company.

Ward & Goldstone, Ltd.

The report for the year ended March 31st last shows a net profit of £12,588 (as against £13,825 in the preceding year), from which is deducted income tax, depreciation, &c. A balance of £25,668 brought forward is added, making £31,148 available. An interim dividend of 7 per cent. has already been paid, and a balance of £23,139 is carried forward. The report states that the reduced profits are attributable to the progressive falls in the value of copper and rubber which necessitated the writing down of stocks. The output and sales have been well maintained, but selling prices have left little margin over costs owing to the keen competition from the Continent.

Melbourne Electric Supply Co., Ltd.

The directors announce that legal difficulties have delayed a distribution from the company's surplus assets, upon the sale of the undertaking to the Victorian Electricity Commission, which they had hoped to make shortly. The delay is connected with the abnormal condition of the British-Australian exchange rate. They state, however, that they see no reason to vary their previous statement regarding the amount which should be available for distribution when the normal exchange position is restored.

London Electric Railway Debenture Issue.

On Friday last week the London Electric Railway Co. offered for public subscription £5,000,000 of 5 per cent. redeemable debenture stock at £97 10s. per cent. This stock is a part of that authorised by the London Electric Railway Companies' 1930 Act, which totals £11,850,000, for the extension and improvement of their systems. The Government is making grants in respect of the works involved at the rate of 3 per aggregate maximum of £9,917,000. The issue was heavily over-subscribed within an hour of the opening of the lists.

Chiswick Electricity Supply Corporation, Ltd.

The directors have decided to reduce the interim dividend from 7½ per cent. to 6 per cent. (actual), and they state that their decision is due to the fact that the Minister of Transport has made an Order reducing the maximum permissible price and the minimum quarterly charges. It is proposed to make an issue of ordinary shares shortly for the purpose of redeeming the outstanding debentures. These will be offered at par, as rights, to present shareholders in the proportion of one new share for each three held.

Reductions of Capital.

PRESSED STEEL CO. OF GREAT BRITAIN, LTD.—A petition presented to the High Court for the reduction of this company's capital from £1,600,000 to £1,200,000 is to be heard on July 21st.

THOMAS MITCHELL & SONS, LTD.—A petition presented to the Court of Chancery of the County Palatine of Lancaster, Manchester District, for the reduction of this company's capital from £30,000 to £21,000 is to be heard at the Assize Courts, Strangeways, Manchester, on July 21st.

East African Power & Lighting Co., Ltd.

The accounts for 1929 show a profit, including Shs. 33,914 brought forward, of Shs. 1,334,797 (as against Shs. 1,129,719 in 1928). General reserve receives Shs. 60,000, staff fund Shs. 60,000, and a final dividend of 4 per cent. is paid on the ordinary shares, making 7 per cent. for the year, leaving Shs. 30,940 to be carried forward. Negotiations with the Government are pending for permission to carry out further hydro-electric development.

Allen West & Co., Ltd.

An extraordinary meeting has been called for July 22nd for the purpose of considering a resolution raising the company's capital to £700,000 by the creation of 100,000 £1 cumulative participating preference shares, ranking *pari passu* with the existing shares of this class, and 100,000 ordinary shares of £1 each. It will be recalled that the company recently acquired extensive new works at Woolston, Southampton.

Kalgoorlie Electric Tramways, Ltd.

The gross receipts for 1929 amounted to £22,675 (against £23,090 for 1928). The net profit before charging depreciation was £4,560, and after providing for depreciation (£1,000) and debenture service (£9,560), the debit balance, including £96,520 brought forward, is increased to £102,520. The number of car-miles run decreased from 276,825 to 273,555, and the number of passengers carried from 1,503,687 to 1,470,836.

Victoria Falls & Transvaal Power Co., Ltd.

The report for 1929 shows a revenue of £1,083,237 (against £1,062,675 in 1928), and a net profit of £380,331 (£377,296), to which is added £153,747 brought forward, making £534,078 available. The reserve again receives £50,000. A final dividend of 12 per cent., less tax, is recommended on the ordinary shares, making 15 per cent. for the year (as for 1928), leaving £172,578 to be carried forward.

Berry's Electric (1928), Ltd.

The report for the year ended March 31st last shows a trading profit of £23,090, to which is added a balance brought forward of £1,406, making £24,496. After deducting interest on cumulative notes, &c., and transferring £6,429 to reserve, it is proposed to pay a dividend of 2½ per cent., free of tax, to apply £3,398 to the reduction of preliminary expenses, and to carry forward £305.

Wolseley Sheep Shearing Machine Co., Ltd.

The accounts for 1929 show a profit of £11,646 (against £18,092 for 1928), to which is added £10,617 brought forward. £5,000 is placed to reserve, and it is proposed to pay a dividend of 7½ per cent. (against 10 per cent.), leaving £9,763 to be carried forward.

Anglo-American Telegraph Co., Ltd.

The directors have declared an interim dividend for the quarter ended June 30th of 15s. per cent. on the ordinary stock, less tax.

Brazilian Traction, Light & Power Co., Ltd.

A quarterly dividend of 50 cents per share has been declared on the ordinary shares of no par value, payable September 2nd.

Yorkshire Electric Power Co.

The directors recommended a dividend at the rate of 6 per cent., less tax, on the ordinary shares for the half-year, payable August 1st.

Electrical Distribution of Yorkshire, Ltd.

A dividend at the rate of 9 per cent. per annum is recommended on the ordinary shares for the half-year, payable in August.

Smithfield Markets Electric Supply Co., Ltd.

An interim dividend of 3 per cent., less tax, is recommended on the ordinary shares.

J. & E. Hall, Ltd.

An interim dividend of 2 per cent. has been declared on the ordinary shares.

Electrolytic Zinc Co. of Australasia, Ltd.

A dividend of 4 per cent. has been declared for the six months ended June 30th (against 6 per cent.).

Western Union Telegraph Co.

A quarterly dividend has been declared on the common stock of $2 per share, payable July 15th.

Consolidated Gas, Electric Light & Power of Baltimore.

A quarterly dividend of $0.90 per share has been declared on the common shares, payable October 1st.

Telegraph Construction & Maintenance Co., Ltd.

An interim dividend of 2½ per cent., tax free (same), has been declared.

Folkestone Electricity Supply Co., Ltd.

An interim dividend of 4 per cent., tax free, is recommended on the ordinary shares.

Traction & General Investment Trust, Ltd.

An interim dividend of 6 per cent., less tax (same), has been declared.

German Companies.

The *C. Lorenz Company*, which has now passed under the control of the International Telephone and Telegraph Company, reports net profits of 585,000 marks for 1929, as compared with 450,000 marks in the previous year. The dividend is maintained at 6 per cent.

The *Aron Electricity Works Co.*, which was formed by the amalgamation of various undertakings, reports for the first year's activity net profits of 920,000 marks, and a dividend of 10 per cent. is being paid. The turnover of the meter branch is stated to have been about on the level of that in the previous year; the sales of the clock branch were satisfactory, and the turnover of the radio department made considerable progress.

French Companies.

The *Compagnie Continentale Edison* is paying a dividend for 1929 of 40 fr. per share out of net profits of 2,028,000 fr.

The *Compagnie Générale de Télégraphie sans Fil* records net profits of 10,816,000 fr. for 1929; the dividend is at the rate of 50 fr. per share.

The *Compagnie Parisienne de Distribution d'Electricité* reports an increase in the net profits from 35.4 million fr. in 1928 to 38.1 millions last year; the dividend is raised from 65 fr. to 70 fr. per share.

The *Compagnie des Lampes* earned net profits of 28,500,000 fr. in 1929. It has been decided to pay a dividend at the rate of 80 fr. per share, leaving 2,883,000 fr. to be carried forward.

Austrian Company.

The *Austrian Siemens-Schuckert Works* reports that in 1929 the works were mainly occupied in completing orders brought over from the previous year, but in the final quarter there was a scarcity of work so that short time and discharges took place, and no improvement in the situation has occurred in 1930. The accounts show net profits of 3.45 million sch. as compared with 0.83 million in 1928, and the dividend is raised from 6 per cent. to 8 per cent.

Stocks and Shares.

TUESDAY EVENING.

STOCK Exchange markets continue to benefit from the revived hopefulness with which they were inspired by what has now come to be known as the "Bankers' Manifesto." Closer examination of that document may have tempered some of the optimism with which it was at first hailed, but the feeling remains that the financial powers of the country are bending their energies in the direction of making every endeavour to meet the pressure of economic circumstances, which are reflected in the unemployment figures, the Board of Trade returns, and other evidences of shrinkage in industry. The spurt which occurred in shares of the iron, coal, and steel market, proved to be short-lived. This is not very surprising in view of the fact that the buyers were, as a whole, of the speculative class. They were soon disappointed at the reluctance of the investing public to come forward with supporting orders on the strength of anticipations which it may take several years to realise.

London Electric Railway Success.

The outstanding feature remains the abundance of money which is available for employment in first-class securities. No better illustration of this can be found than the remarkable success which attended the issue of £5,000,000 London Electric Railway 5 per cent. debenture stock. The subscription lists were closed within half-an-hour from their opening, and the rush to apply for the stock was not confined to London alone. The stags turned out in full force, for a 5 per cent. debenture of this kind, bearing a rather curiously partial guarantee for fifteen years of the British Government, was enough to attract the speculative brigade. It seems a little singular that the London Electric Railway should have been content to accept the modest price of 94½, having regard to the nature of the security and the present-day appetite for stocks of this description. The opening price of the scrip was ¾ premium. Applicants for £100 stock were satisfied in full; for £1,000, they received £100, and the basis of allotment on the larger amounts was 10 per cent. A ready-made demand was apparent, and the price rose steadily to 1¼ premium. It may be expected to go to the neighbourhood of 99½, for there is very little stock of similar character that can be bought below three figures.

New Issues.

Practically all the recently-issued stocks of good class are readily taken. The premium on Newcastle Electric 5 per cent. debenture, offered at 96, has risen to 20s. Pirelli-General Cable Works 5½ per cent. first mortgage guaranteed debenture has strengthened to 101. The demand for underwriting of Edmundsons' Electricity Corporation 5 per cent. debenture stock at 93¼ was keen, but in spite of this the public subscription took only 47 per cent. of the offer. The price rose from 2s. 6d. discount to 5s. premium. The City of Dunedin (New Zealand) has been in the market with an issue of £100,000 5 per cent. Electric Power loan, and it is expected that there will be a market started in this debenture, in the near future, on the basis of 96 or thereabouts.

Home Railway Stocks.

The Underground Electric Railways of London announces that of the total outstanding of £6,330,050 6 per cent. income bonds of the company, £5,916,380 has been lodged for conversion into ordinary shares. The balance will be repaid on March 31st, 1931, presumably at 103 per cent. From this it is obvious that holders of over £400,000 of the bonds neglected the urgent reminder that they should either convert their holdings into shares, or should sell the bonds at the market price of about 110, which ruled prior to the expiry of the period in which the conversion into shares could be exercised. The shares are firm at 24s. 6d., and the 6 per cent. income bonds remain at 105. Metropolitan consolidated and District ordinary stocks have both improved by reason of the excellent traffics which are being secured by the companies. Interim dividends on the steam stocks will be declared, by the way, towards the end of next week. It is observed in the market that the Southern Railway is steadily becoming a candidate for entry to the electric railway list.

Cables and Wireless.

A lively meeting of proprietors of Cables and Wireless took place this (Tuesday) afternoon, and was still in progress when the Stock Exchange closed at four o'clock. Therefore no official dealings occurred in the stocks as a direct outcome of the meeting, though it was taken for granted that the proceedings at the meeting would be likely to give cause for a good deal of activity in the stocks. On the week, the price of the ordinary has fallen 2 to 25½. There was a tendency to further depreciation on the day of the meeting.

Previously, the shareholders in Marconi's had met, and also the proprietors in the three cable companies—Eastern, Eastern Extension and Western Telegraph. The four companies remain as separate entities, but dealings in their stock and shares are, of course, a rarity. The Eastern Telegraph Company, which for many years paid annual dividends of 10 per cent. free of tax, declared a dividend for last year of 7½ per cent. less tax. The Eastern Extension's dividend for last year was 10½ per cent., and the Western's £10 18s. per cent., less tax in both cases. The last two companies, like the Eastern Telegraph, had paid 10 per cent. free of tax for several years past.

Marconi's.

The chairman at the Marconi meeting emphasised the fact that the company was now a non-traffic undertaking, but he also laid stress upon the research work and other branches of wireless industry in which he claimed that Marconi's continued to lead the way. The meetings of the shareholders of the cable companies were more or less formal, and even the Marconi gathering proved to be a tame affair in comparison with the stormy assemblies which preceded the entry of the company into the Cables and Wireless merger. Canadian Marconi shares are quoted at £1. Marconi Marines have advanced to 38s. 9d. American Telephone and Telegraph, after dipping to 215, recovered to 218, and International Telephone and Telegraph capital stock, which has been down to 45, revived to 48.

Home Electricity Supply.

Beyond a few ex-dividend quotations, the prices in the market for Home electricity supply shares remain almost unchanged. Amongst the London shares, practically no alterations have occurred. The Chiswick Electricity Supply Corporation has declared an interim dividend of 6 per cent., instead of 7½ per cent., which latter rate has been paid for each of the last three years. This, apparently, is due to the order of the Minister of Transport, reducing the maximum price for electricity at Chiswick. County of London new ordinary shares are firm at 8s. In the provincial group, Newcastle-on-Tyne ordinary at 23s. 9d. are 1/16 better; Yorkshire Electrics have risen 9d. to 32s.; and Scottish new shares are a trifle harder at their par price. British Power and Light shares at 13s. 6d. have shed a few pence. Atlas ordinary at 26s. are 6d. better. Electric Supply Corporation shares hold their rise at 48s. 3d.

Manufacturing and Equipment.

Henleys at 6½ have recovered the fraction that they shed last week. The report shows an increase of nearly £20,000 in the earnings at £374,264, and the directors add that the amount of business carried out by the company during the past year was satisfactory. Brush ordinary stock has been changing hands as low as 115, although the nominal price is left unchanged at 120. A meeting of the company's prior lien participating second debenture stockholders has been held to consider a resolution that will enable the company to redeem the outstanding stock of this class, at 128¼, at three months' notice, expiring on any interest date. Associated Electrical Industries ordinary shares are 1/16 up at 25s. The company has called a meeting, to be held on July 30th, for the purpose of adopting a completely new set of articles drawn up in accordance with modern practice. The principal change will be the sub-division of the £2 preference shares into two.

Telegraph Constructions.

In which connection, it may be pointed out that another anomaly resides in the retention by the Telegraph Construction & Maintenance Company of the clumsy denomination of £12 for its shares. Were the shares to be divided into twelve a freer market would be assured. G.E.C. ordinaries are better at 50s. 9d., English Electrics are 1/16 up at 16s. 3d., Philips Lamps eased off to 58s. 9d., and the rest of this market is steady.

Dollar Stocks.

Recoveries have occurred in several of the Mexican utility shares, following upon the falls which took place a week ago. Mexican Light and Power common and the company's preference shares are up 2 and 3 points, respectively, but, on the other hand, Mexico Tramway 5 per cent. bonds shed a couple of points to 61¼. Brazilian Tractions are a little better at 41½. The American utility shares attract but languid interest. Calgary Power shares are 155, Shawinigans 68½, Pennsylvania Water and Power 80½, Power Corporation of Canada 70½. Brazilians, apart from Brazil Tractions, remain dull, in consequence of the uneasiness aroused in regard to the finances of the country.

Traction and Tramway.

British Electric Traction deferred ordinary stock has moved up to 1,525, a rise of 25 points. Amongst foreign shares, Anglo-Argentine Tramways second preference are weak at 2¼, a fall of 3/16, selling having been caused by the recent report, and the meeting which followed it. Kalgoorlie Electric Tramways reports a decrease in the number of passengers carried as compared with each of the two preceding years. The 5 per cent. "A" debenture stock is quoted nominally at 95, and the 6 per cent. "B" debenture at 12½. The last-marked bargain in the latter is at 10, on April 30th this year. No changes have taken place in the prices of shares in the London Tramway group.

Miscellaneous Matters.

The rubber share market is heavy, the price of the raw produce having fallen to practically the lowest figure on record. Meetings are being held this week between British and Dutch interests with a view to see whether anything can be done to assist the industry, but no particular hopes appear to be built upon the issue of the negotiations. The iron and steel market is a little easier, Vickers, for example, going back to 6s. 9d.

Share List of Electrical Companies.

Home Electricity Companies.

	Nom.	Approx. Dividend. 1928.	1929.	Price July 15 1930.	Rise for fall	Yield p.c.
	£					
Bournemouth and Poole	1	15	15	67/6	—	5 4 8
Brompton Ordinary	1	8½	8½	26/6	—	5 5 8
Charing Cross Ordinary	1	8½	8½	28/-	—	5 0 0
do. do. 4½% Pref. ...	1	4½	4½	18/-	—	5 0 0
Chelsea	1	8⅝	8⅝	26/6	—	5 5 8
City of London	1	10	10	33/9	—	4 3 1
do. do. 6% Pref.... ...	1	6	6	23/-	—	5 4 4
Clyde Valley	1	8	8	38/3	—	4 3 9
County of London	1	7	10	41/9	—	4 7 4
do. do. 6% Pref.... ...	1	6	6	23/-	—	5 4 4
Edmundson's 7% Pref.	1	7	7	24/-xd	—	5 16 8
Elec. Supply Corporation	1	11	11	48/3	—	4 11 3
Kensington Ordinary	1	8	8	27/-xd	—	5 3 8
Lancs. Light and Power	1	7½	7	25/-	+6d.	5 12 0
London Electric	1	8½	9	29/6	—	4 15 0
Metropolitan	1	9	10	40/-	—	5 1 3
do. 4½% Pref.	1	4½	4½	17/-	—	5 6 0
Midland Counties	1	6½	7	27/6	—	5 1 10
Mid. Elec. Power	1	15	8	32/-	—	5 0 0
Newcastle-on-Tyne Ordinary ...	1	6	6	23/9	+1/16	5 1 1
do. 7% Pref.	1	7	7	26/-	—	5 7 8
Notting Hill 6% Pref.	10	6	6	10⅞	—	5 11 4
North Met. Elec. 6% Pref....	1	6	6	22/6	—	5 5 9
St. James' and Pall Mall	1	8	8	28/-	—	5 0 0
Scottish Power	1	8	8	28/-	—	5 14 4
South London	1	8½	8½	27/6	—	5 1 10
Urban Ordinary	1	7	7	32/6	—	4 6 2
Westminster Ordinary	1	8½	8½	27/-	—	5 3 8
Whitehall Elec. Invst. 7½% Pref....	1	7½	7½	24/6	—	6 2 5
Yorkshire Elec.	1	8	8	32/-	+9d.	5 0 0

Home Rails.

Central London Ord. Assented ...	Stock	4	4	77	—	5 4 0
Metropolitan	,,	3½	4	66	+½	6 1 2
do. District	,,	4	5	78	+½	6 8 2
Underground Electric	£1	7	8	24/6	—	6 17 8
do. do. Income ...	Bonds	6	6	105	—	5 14 3

Telegraphs and Telephones

Anglo-Am. Tel. Pref.	Stock	6	6	100½	−2	5 19 4
do. Def.	,,	1½	1½	24	—	6 5 0
Automatic Telephone	1	10	12½	35/-	−1/2	7 2 10
Cables & Wireless 5½ Pref.... ...	Stock	—	5½	77½	—	7 2 0
do. A 7½ Ord.	,,	—	—	2⅜	−2	... ...
do. B Ord.	,,	—	—	12½	—	... ...
Globe Tel. and T. Ord.	10	10	10	16½xd	−¾	*6 1 3
do. do. Pref.	10	6	6	10¾xd	—	5 11 7
Great Northern Tel.	10	20	20	29	—	6 18 0
Marconi-Marine	1	12½	15	1 15/16	+1/16	7 14 10
Oriental Telephone Ord.	1	12	12	55/-	—	*4 7 3

Home and Foreign Trams, &c.

Anglo-Arg. Trams First Pref. ...	5	5½	5½	2 7/16	—	11 5 8
do. do. 2nd Pref. ...	5	6	6	2¼	−1/16	13 6 8
do. do. 5% Deb. ...	Stock	5	5	64½	- 1	7 15 0
British Electric Traction Def. Ord.	,,	5	5	1525	+25	... ...
do. do. Pref. Ord.	,,	8	8	133½	—	6 6 6
Brazil Traction	100	7	8	41½	+1½	4 16 5
Brit. Columbia Elec. Rly. Pcs. ...	Stock	5	5	91½xd	—	5 9 8
London & Sub. Trac. 5% Pref. ...	1	Nil	Nil	9/-	—	... ...
London United Tram Deb. ...	Stock	4	4	50½	—	7 18 4
Mexico Trams, 5% Bonds	—	5	5	61½	−2	8 2 8
Mexican Light Common	100	Nil	Nil	71½	+1	... ...
do. 7% Pref.	100	7	7	76½	+1	9 3 0
do. 1st Bonds	—	5	5	81	—	6 5 0
Victoria Falls Ord.	1	15	15	3 5/16	—	4 18 6
Yorkshire (West Riding)		Nil	Nil	5/-	—	... ...

Manufacturing Companies.

Assoc. Elec. Ord.	1	6	6	25/-	−1/16	4 16 0
Babcock & Wilcox	1	13	15	55/9	+9d.	*5 7 6
British Aluminium Ord.	1	10	10	40/-	—	5 0 0
British Elec. Transformer Pref. ...	1	7	7	8/9	—	... ...
British Insulated Ord.	1	15	15	32	—	4 0 0
Brush Ord.	Stock	10	10	120	—	8 6 8
Callenders	1	15	15	3 5/16	—	4 4 0
do. 6½% Pref.	1	6½	6½	23/9	—	5 9 5
Crompton Parkinson Ord.	5/-	—	80	23/9	—	6 8 4
do. 8% Pref.	1	8	8	25/9	—	6 4 3
Edison-Swan 1st. Pref.	1	7½	7½	24/6	—	7 1 2
do. 5% Deb.	Stock	5	5	84½	—	5 18 4
Electric Construction	1	5½	5	12/-	—	8 6 8
Enfield Cable Ord.	1	20	20	4½	—	4 14 1
English Electric	1	Nil	Nil	16/3	+1/16	... ...
do. do. Pref.	1	8	Nil	19/6	—	... ...
Gen. Elec. Pref.	1	6½	6½	24/3	+7d.	5 10 7
do. Ord.	1	10	14	50/9	+9d.	5 10 3
Henley	1	25	30	6½	+½	5 0 0
do. 4½% Pref.	5	4½	4½	4½	—	5 6 0
India-Rubber	1	Nil	Nil	7/6	—	... ...
Johnson & Phillips	1	10	10	1½	—	5 6 8
Siemens Ord.	1	7½	7½	21/3	—	7 1 2
Telegraph Construction	12	10	10	18½	—	*6 7 6

* Dividends paid free of Income Tax.

Wiring Rules at West Ham.

The results of the adoption of the I.E.E. Wiring Regulations as bye-laws.

By J. W. J. TOWNLEY, A.M.I.E.E., Engineer and Manager.

FOR many years past West Ham, like other progressive undertakings, has employed installation inspectors who have been specially trained with a view to ensuring so far as is possible that electrical installations connected to its mains shall be installed in such a manner as to be reasonably safe and satisfactory, and I understand that so far back as 1910, although no bye-laws existed for this district, contractors and consumers were advised that the Corporation desired that installations should comply with the Wiring Rules of the Institution of Electrical Engineers; in fact, the Corporation even went beyond that point as, since the date mentioned, it requested that in bathrooms all-insulated switches should be installed, and, although there were certain difficulties in this respect in the early days (partly due to the difficulty in obtaining suitable switches), it was possible, by explaining to the contractors and consumers that the reason was entirely from the point of view of safety, to get the customer to meet the wishes of the Corporation in respect to bathroom switches.

In like manner we now discourage the use of any portable apparatus in bathrooms, and where electric radiators or other apparatus are required for use in bathrooms we advise the consumer that we require these to be permanently fixed and connected without the use of wall plugs or flexibles, and the same results are being obtained as in the earlier days with switches, *viz.*, that when we point out to the consumer and the contractors that it is a question of individual safety we invariably find that our wishes are complied with, although strictly speaking it is not laid down in the bye-laws.

In 1925 the Corporation promoted a Bill in Parliament which included provisions for the making of bye-laws with powers to " refuse to supply electricity or cut off and discontinue the supply of electricity to any building or premises in which such bye-laws are not complied with." Permission was then obtained for the bye-laws to be based on the " Regulations for the Electrical Equipment of Buildings " as issued by the Institution of Electrical Engineers, and on April 27th, 1926, the Corporation seal was attached to the bye-laws accordingly, and these bye-laws were confirmed by the Electricity Commissioners on November 24th, 1927.

Since the adoption of the bye-laws very little difficulty indeed has been experienced in getting contractors to carry out installations to the requirements; in fact, the more important contracting firms make it the practice, and not the exception, to arrange for their work to be in accordance with the " Regulations for the Electrical Equipment of Buildings," and consequently, as these regulations are identical with our bye-laws, no difficulty whatever has arisen in such cases. A few small contractors, however, were at first inclined to put difficulties in the way, but when our powers under the West Ham Corporation Act, 1925, were explained to them they appreciated that it was quite impossible for them to resist.

With regard to the methods of inspection, the installation inspecting staff works under a chief installation inspector, who is advised of all applications when received, and at the first opportunity one of the installation inspectors calls and inspects the work during progress and can generally form an idea without waste of time as to the class of installation which is being provided and whether it is necessary to make several visits during the period of installation. The position at present is that the reputable contractor who promises to have the work carried out in accordance with the Regulations does not need watching, although a complete inspection is of course necessary when the work is nearing completion, chiefly on account of the possibility of mistakes. In some cases we may have to make a number of calls, or, even where the work is completed before application is made, we may have to insist on floor boards being raised, although in the interest of the householder this is not done unless the inspector has cause to suspect that the work is not in order.

We are, however, quite unable to ensure in every case that the bye-laws will be carried out as, unfortunately, quite recently a fatality occurred due to the frame of an electric fan becoming alive; in this case the fan was installed without the Corporation being advised, and I am afraid that under present conditions it is quite impossible to take proper steps to safeguard the users if apparatus, as in this case, is installed without the knowledge or consent of the undertakers. Had we been advised we should have very carefully considered if the conditions under which this apparatus was to be used would not call for the earthing of the fan under Regulation No. 96, as from what little knowledge we have been able to glean with regard to the case in point I do not think the installation would have been sanctioned without the frame of the fan being earthed.

I am of opinion that no reasonable engineer would suggest the necessity of earthing the frames of electric fans, radiators, &c., when used under conditions which would make it impossible for anyone touching them to receive a shock, but certainly in bathrooms, or where there is a conductive floor, or where the appliance is within reach of earthed metal, then undoubtedly efficient earthing should be enforced.

Electrical contractors will be particularly interested in the method of inspection. Our experience, as already stated, has shown that the reputable firms have no objection whatever, and it is many years since any complaint was received from a contractor of any importance suggesting that the inspectors had exceeded their duties. I am sorry to say that this has not been the case with one or two " jobbing " contractors who have tried to prevent the inspector from making a thorough examination, but in nearly all such cases such action has been found to be due to the work not being all that could be desired.

The necessity for proper inspection of installations must be admitted by everyone concerned in the industry and, if the right type of inspector is chosen, and he is trained on the proper lines (having the interests of the industry and the consumer properly explained to him), there should be no difficulty whatever, but where the inspector is proved to be right, he should receive proper support and it should be insisted that the work be put in order in all cases where a breach of the regulations is found to exist. A great deal could be said regarding the type and class of man necessary for this work, but it is certainly not a job which should be entrusted to the inexperienced, while, on the other hand, a senior officer of an undertaking, who cannot spare the time to do this work properly, should not be required to carry out installation inspection, except in very important cases or where a dispute arises.

The World Power Conference.

The Second Plenary Meeting held at Berlin.

By OUR SPECIAL COMMISSIONER.

No. 4.*—*Continuation of extracts from, and comments on, selected papers of electrical interest submitted and discussed by delegates.*

A.C. Motors.

The outstanding feature of the development of a synchronous machines is the effort to improve their power factor. The methods employed to arrive at this result appear to depend to a large extent upon local conditions. Relatively sparsely inhabited countries tend to create a demand for a motor of liberal design, with weak saturation, such that a power factor of 0.9 may be obtained even at half load. In industrial regions where the power demand is more highly concentrated it is considered better practice to install special machines for supplying the magnetising current. American practice prefers the use of synchronous condensers, whereas in Europe the asynchronous machine is preferred. The whole subject of power factor, or, to speak more correctly, the supply of the necessary amount of reactive power to the network, is undergoing rapid development. In those countries where the local conditions have brought the problem right into the foreground a considerable amount of research work is being carried out, not only in connection with the amount of reactive power required, but also in connection with the points where it should preferably be supplied. Future development of machines for this specific purpose is undoubtedly linked up with the results obtained from this research work, and during the next few years many changes may be expected.

With regard to the trend of the motor proper, the squirrel-cage type is receiving increasing attention. The entire absence of electrical moving parts, the added simplicity, and the improvement in design, particularly in connection with the starting characteristics, have resulted in the widened use of this type.

Double-cage (Boucherot) type motors are being developed in sizes hitherto unheard of. Motors up to 200 or 300 h.p. are now built for direct connection to the network, which is more particularly true of American practice since the type has been hampered in Europe by the stringent regulations of the supply authorities.

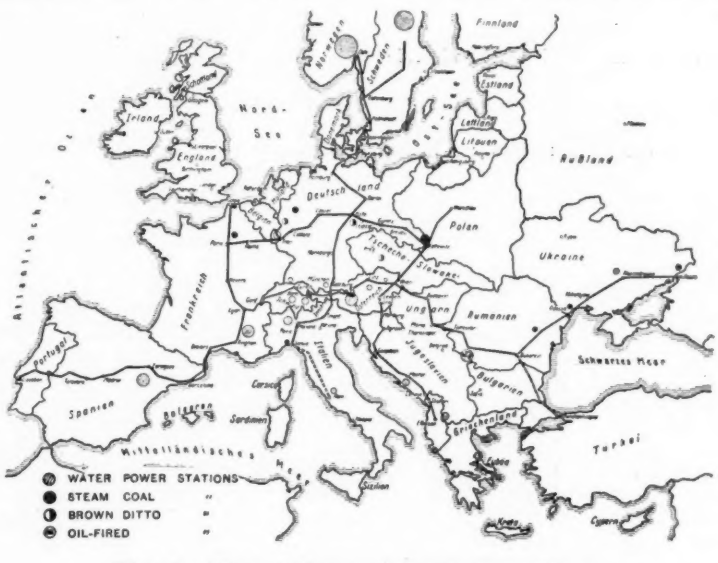


Fig. 1.—Map of European Super-power Lines.

Commutator Motors.

The field for this type of machine is more strictly limited, and it is considered that the limiting capacity has been reached by the 12,000-kW, 500-volt, machines recently installed in Norway. The principal limiting factor appears to be the permissible voltage between bars. With the exception of a number of machines of British design built in France with radial commutators, no great progress appears to be in hand.

Transformers.

The limiting capacity of transformers is governed by the mechanical stresses set up by short circuits. Three-phase transformers of 125,000 kVA at 50 cycles is the present limit, but it may be anticipated that it will be increased to 150,000 kVA after making allowance for the voltage drop that takes place on short circuit. Iron losses are still being reduced, and it is reported that in America alloy sheets with a loss coefficient of one watt per kilogram may be obtained.

Operating voltages of 380,000 volts are already in service, and it has been found advantageous to use this voltage for outputs above 10,000 kVA, while 400,000 volts is already being spoken of and is referred to later in Prof. Olivaren's address on a scheme for a European grid. The report states that the earth-leakage coil, which has proved satisfactory, is being adopted to an increasing extent, even in countries which were originally opposed to its use. The subsequent discussion showed, however, that there is still a very great diversity of opinion on this subject.

Oil Tests.

A few papers dealt with oils. Their testing to an international standard is at present being carefully studied by a Special Advisory Committee of the I.E.C., one of whose objects is to devise a method of testing which will be used internationally to allow of the results being studied on a truly comparative basis.

* For Nos. 1, 2 and 3 of this series see ELEC. REV. June 27th, July 4th, and July 11th, 1930.

Rectifiers.

The introduction of the ironclad mercury-vapour rectifier has resulted in an increase of capacity up to 10,000 amperes with an upper limit of 12,000 volts. Research in connection with back-firing has produced devices which eliminate that trouble, by providing an anode-protective grid made up of concentric cylinders, whereby the ignition voltage for back-fire is increased. This improvement has led to a further increase in capacity up to 16,000 A. Instances were cited of the use of rectifiers exclusively in several cases over a period of several years with very satisfactory results.

A new type of machine is described in a paper from Japan; it consists of an "inverter" designed to give the same results as the Highfield "transverter." Instead of being based on the principle of a rotating commutator, it is based on the principle of the mercury-vapour rectifier and is designed for converting d.c. to a.c. by means of a slotted disk, driven by a synchronous motor, controlling the ignition and the rupture of the arc. The machine, it is claimed, can also be used for converting d.c. into d.c. at a different voltage and, in conjunction with a rectifier, can be used as a frequency-changer in which the number of phases can also be modified. It is not known if any of these machines are in operation and the time allowed for the discussion did not allow of any further details being given.

European Super-power Lines.

The day's proceedings terminated with the "German Hour," during which Dr. O. Oliven outlined a proposal for a European super-power system. The address, delivered in conjunction with the map on the previous page, covers a complete grid for the whole of Europe, with the exception of the British Isles and Russia (U.S.S.R.).

After a brief historical review of the progress of the transmission of electrical energy, starting from the first d.c. line transmitting at 2,000 volts over 57 kilometres in 1882 up to the present commonplace 200,000-volt lines, it was pointed out that 380,000 volts had already been used commercially and in a somewhat conservative manner the author took 400,000 volts as a basis upon which to build the fabric of a European grid system, rather for the interchange of large blocks of power than for the transmission of such blocks over very long distances.

Europe is taken as a complete unit, roughly speaking, with two lines running from east to west, the one along south Europe and the other along the northern portion of central Europe. Three lines connect north and south, the west line taking in France and Spain, the east line connecting Poland, Czecho-Slovakia, Hungary, Jugo-Slavia, and Greece. The respective lengths of the lines are 2,100 km., 3,000 km., and 1,500 km. The average maximum length of transmission is estimated to be of the order of 1,000 km., and the mean transmission capacity at 450,000 kW.

One of the underlying advantages claimed for the scheme is that not only very much larger diversity can be obtained on the demand side, but on the supply side also the natural conditions of a continent taken as a whole are such that the variations of climatic and storage conditions balance themselves according to the seasons. For instance, Alpine sources give their maximum output in the summer from melting snow, whereas the Adriatic coast has its maximum supply in winter chiefly from atmospheric sources. The lines would equally connect the oil fields of Galicia to the lignite deposits of Germany.

On the demand side, it is estimated that the difference in habits of the various countries, coupled with the differences of light and dark periods, which vary by so much as three hours, would have the effect of increasing the factor of utilisation of the peak load from 2,000 or 3,000 hours to 5,000 hours.

The total length of lines involved would amount to approximately 10,000 kilometres, of which 9,750 would be laid across flat, or easy hilly, country; 200 kilometres would be in difficult mountainous regions, whilst the remaining 50 kilometres would be across straits, chiefly between Germany, Denmark, and Sweden.

The estimated costs are £75,000,000 for the lines and £20,000,000 for 25 power-factor correcting stations. Transformers for connecting the proposed grid to existing national and international systems would account for a further £9,000,000. The total cost of the proposed scheme would therefore amount to about £100,000,000.

In connection with the operating costs, although the author uses figures for interest charges and amortisations which are open to criticism, the time that would necessarily elapse before such a scheme could mature might give some ground for optimism in this respect. The total estimated operating cost is of the order of £8,000,000, whilst the annual transmission losses would add a further £1,000,000 to the total cost of transmission. The average transmission cost therefore works out at 0.139d. per kWh. After making allowances for the reduction in generating costs due to such interconnection, the average cost per kWh on the low-voltage side of the transformer stations would be from 0.19d. to 0.2d.

Co-operation in Power Production.

The following day's proceedings opened with Section 17, devoted to co-operation between power-producing plant. Only three papers were presented, one from Germany, one from Italy, and one from the United States, but only the one paper presented by Dr. Ploppa and others dealt with co-operation other than between steam and hydraulic power stations.

This does not mean that co-operation between other types of station does not exist, as there are several well-organised schemes already in being on the Continent in which every type of economical producing plant within the area has been mobilised in some way to form a homogeneous power-producing system, the different units of which are tied together by interconnected exchange lines. The recent paper presented before the Institution of Electrical Engineers describing the results obtained from the interconnection of blast-furnace gas and steam stations in the east of France is ample evidence of this fact, and it was disappointing that information regarding other large schemes which are known to exist was not presented on this occasion.

Dr. Ploppa's paper deals with the experience obtained from the co-operative running of the Kiel-Wik gas and electricity works, and deals with the subject mainly from the point of view of economics. The interconnection of gas-producer plants, gas works, and electricity generating stations is discussed in detail and shows that under given conditions the co-operation of these types of station may be profitable. In such cases the main source of economy appears to lie much more largely in administration than in advantages to be derived from the technical side.

The principal items that favour such co-operation, briefly expressed, are the reduction of overhead costs in the different branches, the centralisation of purchasing departments, the common pool for transportation, accountancy, and other inside services. The amount to be gained from the simplification of certain outside staffs appears to be more far-reaching, and the economics that are made possible by the systematically organised laying of mains and cables are stated in detail.

The most interesting example cited in the paper deals with the interconnection of an electric power station, a gas works, and a low-temperature carbonisation plant. The main obstacle to the entirely successful economic co-operation of these three types appears for the time being to be the disposal of the semi-coke produced by the low-temperature carbonisation plant. Difficulty is met with in successfully burning this type of fuel on power-station travelling grates, whilst at the same time it is not easy to find an alternative market for this product. Undoubtedly both difficulties will tend to overcome together, with the result that in a few years' time further development along these lines may be expected. The paper concludes with an example of triple interconnection between a gas works, an electric power station, and a low-temperature carbonisation plant for treating lignite, using the gas thus obtained for mixing with coal gas for long-distance mains transmission.

Belgian Industry and Trade.

The British Commercial Secretary at Brussels Reports the Continuance of Prosperity.

MR. N. S. REYNTIENS, Commercial Secretary at the British Embassy, Brussels, has forwarded to the Department of Overseas Trade a report on economic conditions in Belgium during 1929 (Stationery Office, 3s. 6d. net). The usual commercial summary which prefaces the report gives the population of Belgium as just under eight millions and its area as 11,750 sq. miles. In 1929 Belgian exports were valued at 32,235 million fr. and imports at 35,510 millions (175 fr. = £1). Great Britain headed the export list with a share of 5,837 million fr. and was fourth in the import list (3,944 million fr.).

In his introductory remarks, Mr. Reyntiens says that having regard to the state of public finance and to the general economic situation, the past year may be considered to have been a prosperous one for Belgium. The Budget is expected to show a surplus and taxation is being reduced by a large sum. Only the agricultural, textile and diamond industries showed signs of depression. There were few labour disputes during the year and unemployment was negligible; in fact there was an actual shortage of labour in many industries and measures to "import" workpeople are under consideration. The situation in the electrical machinery industry is said to have been remarkably good and order books were well filled. Electrical development was again actively pursued and most towns, villages and hamlets in the country now have a supply available.

The author makes special reference to the great quantitative advance (51.2 per cent.) in British exports to Belgium in 1929 and points out that the value rose by only 4.7 per cent. In his opinion the increased trade is due not only to lower prices but also to the individual efforts of British manufacturers to enter the market by means of personal contact. He has noticed with the greatest satisfaction that, when British firms send over specially-qualified representatives able to quote firm prices and ready to study their prospective customers' wishes, business almost invariably results.

Electrical Industry and Trade.

As is stated above, the general situation in the electrical machinery and apparatus industry was good. Both the home and export markets were satisfactory to the trade, some firms being able to dispose of more than 20 per cent. of their total output abroad. Protective tariffs and foreign competition were, however, felt to be severe in the export markets. A new wage agreement was concluded in May last year on the basis of 1.25 fr. per hour for apprentices and 5.25 fr. for fully-qualified workers. These rates increased by a further 25 centimes before the end of the year.

Detailed statistics of Belgium's foreign electrical trade during 1929, by weights, were given in our issue of May 2nd (p. 840), but we may briefly review the principal features of this trade and give values. The total value of dynamo-electric machinery exported during the year was 41.7 million fr. (against 43 millions in 1928), while imports of this class had a value of 140.7 million fr. (against 96.7 millions—an increase of 37 per cent.). The chief purchasers from Belgium were the Belgian Congo, Holland and Argentina. Great Britain's share was valued at 2 million fr. The principal suppliers of dynamo-electric machinery to Belgium were Germany and France, and Great Britain's quota is given as 8.7 million fr. In the case of submarine electric cables (a term which apparently covers a number of classes) Belgium's exports amounted to 48 million fr. (against 60.6 millions in 1928). Great Britain was the principal purchaser taking goods worth 16 million fr. Imports into Belgium of this class (chiefly from Germany) were valued at 9.8 million fr. (against 5 millions). Electric meter imports increased, Switzerland and Germany being the chief suppliers; there was a small export trade in this class. Electrical apparatus, parts, &c., "with insulating equipment," were imported to the extent of 86 million fr. (against 63 millions); Germany and France supplied the bulk of these goods. The value of Belgian exports of this nature remained practically stationary at 13.4 million fr.; the leading markets were the Belgian Congo and Holland. In the case of electrical apparatus, parts, &c., "without insulating equipment," imports increased in value from 82.9 to 115.5 million fr., France and Germany again heading the list of suppliers. The Belgian Congo and Holland were again the principal customers for Belgian exports of this category, the total value of which rose from 10.7 to 13.4 million fr.

The Radio Industry.

During 1929 Bills were introduced providing for the State control of radio broadcasting and the raising of the licence fee from 20 to 60 fr. a year but neither measure had passed into law at the end of the year. Mr. Reyntiens says that the radio trade was quieter, on the whole, than in 1928, due to financial depression and consequent slackening of the demand for sets. The Belgian industry is in the hands of two or three companies, one of which has semi-official support. German competition is reported to be keen in the medium and cheap grades, and large trade discounts are now being given by a good many firms. Components of British manufacture, with the exception of certain specialities, have at present very little sale. United Kingdom firms have yet to produce a receiver for the Continent which can compete for the needs of the average buyer. British loud speakers still retain their superiority in the expensive field. In the cheaper grades German competition has mastered the market. Certain British manufacturers of valves have been active in Belgium. Price concessions have been made and ground is being gained. It is reported, however, that a certain difficulty exists owing to the different characteristics of the British-made valve as compared with the one of Continental make.

Electrical Progress.

The electrification of the Belgian provinces was actively pursued during the year 1929. 2,500 out of the 2,700 Belgian communes now supply electricity either through their own services or through the intermediary of distributing companies. The remaining 200 communes, which are mostly in Western Flanders, have not taken any measures as yet in this direction, but they are likely soon to be supplied by existing distribution services. Their population, moreover, is very small. Central power stations increased their capacity by 190,000 kVA, whilst their total production rose by 300 million kWh, thus reaching over 1,600 millions. If the production of the municipalities' own stations be added to this figure a total of 1,800 millions will be reached, or 230 per head of the population for the communes involved. As the output of the industrial power stations amounts approximately to 2,300 million kWh (excluding plant producing less than 25 kW), the total production can be estimated at 4,100 million kWh, or 512 kWh per head of population. The industrialists grouped under the *Union Générale Belge d'Electricité* are pursuing the execution of their programme. They have constituted the *Union des Centrales du Hainaut*, which is already in operation. Their aims are (1) to group power stations for co-operation, (2) to supply electric power to works requiring more than 1,000 kW.

In the meantime the important schemes for the electrification of the country are being carried out. It is expected that the large power station of Schelle—which is being constructed at the meeting point of the rivers Scheldt and Rupel—will be completed in 1930, and that the 150,000-V line, constructed by the "Linalux" between Liége and Southern Luxemburg, will be ready this year. The unification of the frequency will allow of the creation of new inter-connecting lines, which will further ensure the regular working of producing stations. By the end of 1930 the frequency of 50 cycles per second will be in use everywhere.

Communications.

The report contains a section dealing with the Belgian communication systems in which it is stated that the construction of overhead telegraph lines has been discontinued, telegraph lines now being incorporated in the telephone cables. At December 31st, 1929, there were 198,335 telephone subscribers of whom over 50 per cent. were served by automatic exchanges. Telephonic communication with Finland was inaugurated during the year. It is intended to open a short-wave radio station for communication with South America shortly; it is designed for both telegraphy and telephony.

Swedish Industry and Trade.

The *Swedish Economic Review* states that general employment in Sweden was above the average in the first quarter of this year. In the iron and steel industries there was a decline, but the position of the electrical industry remained favourable and there was occasionally an actual shortage of workers. The exports of electrical machinery during the first four months of the year were valued at 11,003,000 kr. (£611,000), as compared with 9,475,000 kr. (£526,000) in the corresponding period of 1929. The exports of telephone and telegraph apparatus rose in value from 4,825,000 kr. (£270,000) to 5,072,000 kr. (£280,000).

Opportunities in Canada.

Sir William Clark's Advice to British Manufacturers.

SIR WILLIAM H. CLARK, High Commissioner in Canada, attended a recent meeting of the Overseas Trade Development Council to discuss with the Council the development of United Kingdom trade with Canada, especially in relation to the enlarged tariff preferences accorded to this country in the recent Canadian Budget.

In the first place Sir William Clark emphasised the importance of the Canadian market not merely in relation to the present, but having regard also to the future development of the Dominion. Canada now stood fifth of all countries of the world in aggregate external trade, coming next after the United States, the United Kingdom, Germany and France, and was easily first of the five in external trade as measured per head of population. Her achievement, indeed, was the more remarkable in view of her as yet comparatively small population of some 10 millions. It was a tribute to the high degree of organisation and mechanisation alike in agriculture and industry. In this connection Sir William called attention to Canada's immense hydro-electric resources which were being so efficiently developed and were affording power for her industries on probably the cheapest terms of any country in the world. At the present moment Canada took some two-thirds of her total imports from the United States and only one sixth or seventh from Great Britain. Sir William felt that the time had come when there was a real chance that this disparity might be lessened if appropriate efforts were made by United Kingdom exporters. There could be no doubt about Canada's willingness to buy more from the Mother Country; the increased preferences in the Budget were one expression of this desire. There would appear to be special openings under the iron and steel schedules; for tableware of china and porcelain; and for machinery of many kinds. He thought that this last heading would be particularly worthy of study by United Kingdom manufacturers in view of the wide range of mechanical development which was going on in Canada and the large amount of constructional work which was being undertaken.

Sir William Clark then went on to discuss methods of attack on the Canadian market. He pointed out that the market presented certain special difficulties. There was on the one hand the intensive competition from the United States, which enjoyed great geographical advantages. There was also the remarkable growth in manufacture within Canada herself, to which our trade should be so far as possible supplementary rather than competitive. In addition there was a factor which perhaps those who lived in a somewhat conservative country like the United Kingdom were apt to overlook, namely the constantly changing demand arising from changes in conditions of living, and the increasing use of mechanical devices in domestic life. All these considerations necessitated a very close study of the market. There were alternatives which required careful consideration by the different industries concerned—whether in the special circumstances of each industry marketing could be most efficiently conducted by agents, by marketing organisations of the home firm established in Canada, or in some cases by the initiation of branch factories, at any rate for partial manufacture in Canada. Another question which he hoped would be explored would be that of the possibility of alliances with Canadian producers.

In conclusion Sir William Clark urged that the first step should be for the different manufacturing industries of the country to study closely the advantages offered them under the new Canadian tariff, and then that they should spare no trouble and expense to explore how best they could handle their trade and push the sale of their goods in the Dominion.

United States Electrical Exports.

During April last electrical machinery and equipment valued at $11,453,561 was exported from the United States; this represented a decrease of $741,437 as compared with April, 1929. Among the classes which showed large declines were the following:—Insulated copper wires and cables, from $468,881 to $394,814; stationary motors, from $735,907 to $638,455; d.c. generators, from $150,374 to $81,968; batteries (primary and secondary), from $963,769 to $696,888; and watt-hour and other measuring instruments, from $121,008 to $54,942. Several classes showed large increases, including radio apparatus, from $999,348 to $1,428,265; vacuum cleaners, from $67,402 to $204,818; electric fans, from $109,859 to $158,943; railway motors, from $4,829 to $28,475; and switchboard panels (not telephone), from $84,665 to $176,309. Canada, as usual, was the principal importer of American electrical equipment with a share valued at $2,686,569. Great Britain's imports rose to over $1,000,000. Other leading customers were Argentina ($829,394), Mexico ($638,916) and Brazil ($412,059).

Electrical imports into the United States during April were valued at only $168,860. Great Britain and Germany supplied radio apparatus; Japan, Germany and Austria supplied lamps; while a comparatively large quantity of miscellaneous goods were imported from Sweden.

The N.E.L.A. Convention.

A Brief Review of the Addresses delivered at San Francisco.

AS we have already reported, the fifty-third Convention of the National Electric Light Association was held in San Francisco from June 16th to 20th. From the programmes and papers which we have received it is evident that a vast amount of business and pleasure was crowded into this short period.

The president was Mr. M. S. Sloan, whose portrait appeared in our Personal Column last week; he is succeeded by Mr. W. A. Jones, of Henry L. Doherty and Co. In his address on June 17th, Mr. Sloan said that the American electrical industry was making a great effort in response to the call by President Hoover to business men to make good the effects of last year's stock market collapse. Over a billion dollars would be spent during this year on the extension of electrical service. The utilities had nearly reached the minimum rates of charge and the number of new customers had shown a decline. There were, however, still markets to be developed which would improve the load factor without adding too heavily to their investment; that was particularly true of the domestic field. The industry could raise the new capital which it required on fair terms if it was efficiently and economically conducted (as it was at present) and if the regulation of public utilities was carried out in a wise manner. On the same day Mr. Paul S. Clapp, managing director of the N.E.L.A., gave an address in which he reviewed the progress of the American electricity supply industry and the organisation of the N.E.L.A. He said that since 1925 they had secured 5¼ million new consumers of whom five million were domestic. While in those five years the population had risen by 4¼ per cent., the domestic use of electricity had increased by 70 per cent. The industry's investment had grown from six billion to eleven billion dollars in the same period. Dealing with the Association's activities Mr. Clapp showed how a policy of decentralisation was being pursued by the development of "geographic divisions"; by such methods the diverse problems arising from regional differences were given intensive and intelligent local consideration. He also mentioned that in spite of the distance of San Francisco from the other centres of the United States, 3,000 delegates had registered.

We cannot make more than passing reference to the many other addresses and papers which were presented. Mr. Merle Thorpe exposed a number of fallacies which were widely held by the public, such as that public ownership was better than private operation; that hydro-electric power cost practically nothing to produce; that electrical utilities had no competition and that the utilities were becoming too big. The title of an address by Mr. H. Reid (National Electric Power Co., New York) was "The Sin of Silence" and in it the speaker showed how foolish and dangerous it was for electrical utilities to remain silent when they were being attacked, while they had such a good answer to every point raised. Public relations were discussed by Mr. F. W. Sargent (president, Chicago and North-Western Railway Co.). From his railway experience he showed how necessary it was for a public service company to take the customer into its confidence; treat him with the greatest courtesy; and, if possible, secure him as an investor in the company.

Mr. Marshall E. Sampsell, reported upon the activities of the Commercial National Section, whose slogan he said was "More Kilowatt-Hours at a Better Load Factor." He showed that among the aims of the Section were to secure equitable rates, safe and dependable wiring at reasonable prices, the building up of goodwill among consumers, the development of the industrial power and heating load, the encouragement of better illumination, more effective advertising, the improvement of merchandising methods, the spreading of rural electrification and many other matters.

Mr. W. A. Jones dealt with the future of the industry and gave it as his opinion that the electrical industry had lagged behind other newer and less essential industries in commercial development. He, too, considered that it was incumbent upon the industry to make complete and specific answers to the criticisms to which it had been subjected.

Mr. A. W. Robertson (chairman of the board of the Westinghouse Electric and Manufacturing Co.) spoke of the success which had attended his company's "drives" to increase the sale of one particular appliance at a time. Referring to the relationship between the public utility and the manufacturer, he said that they had both been so engrossed in their mutual affairs and in endeavouring to reduce their prices, that they had quite overlooked the fact that installation costs remained too high and were retarding development.

The chairman of the Accounting Section (Mr. W. R. Emerson), in urging the need for a uniform system of accounting, said that one of the several important factors which had permitted "big business" to grow to its present gigantic proportions was scientific accountancy. Mr. Martin J. Insull claimed that the electrical industry could not have reached its present magnitude except through the holding companies' ownership of operating companies' common stock. He also

maintained that the best form of public regulation was its application to the operating companies and not to holding companies. In an address entitled "The Electric Dollar," Mr. Edwin Gruhl proved that a dollar spent on electricity secured better value than the same amount disbursed in any other direction. The point of view of the public service commission was put by Mr. W. A. Prendergast, past chairman of the New York State Commission, while Mr. W. J. Hagenah also agreed that sane State regulation was in the best interests of the public and the industry. The technical progress made during the past year was reviewed by Mr. A. D. Bailey, chairman of the Engineering National Section. An authoritative view of rural electrification was put forward by Mr. M. S. Winder, of the American Farm Bureau Federation. He thought that electricity would be an important factor in preserving the individual American farm. The need for the fullest publicity was again stressed by Mr. B. F. Weadock in an address on "Federal Trade Investigation." In this address he dealt with the inquiry recently made into the electrical industry by the Federal Trade Commission. The *raison d'être* of holding companies was again presented by Mr. M. A. Morrison, and the relation of the accountant to the management formed the subject of an address by Mr. F. T. Griffith. An excellent survey of water-power development in California, with notes on future developments, was given by Mr. A. H. Markwart, while the general power position in the State was dealt with by Mr. F. B. Lewis, who said that there were signs of a definite reversion from water to steam power. Mr. A. H. Kehoe showed the necessity for reducing the investment per kilowatt of generating plant installed; he said that although generating plant costs had fallen by 12 per cent. between 1922 and 1929 there had been an increase in total system cost of 20 per cent.

Mr. C. E. Greenwood reviewed the activities of the Lighting Bureau, on behalf of the chairman, Mr. M. E. Skinner, and the work of the Commercial and Industrial Power and Heating Bureau was reported upon by Mr. V. M. F. Tallman (chairman). In his report on the Merchandising Bureau, Mr. F. D. Pembleton said that it had been estimated that the sales of domestic electrical appliances had risen from $813 millions in 1928 to $925 millions in 1929. In dealing with the immense possibilities which lay before the industry, Mr. Martin J. Insull said that they must not merely sell kilowatt-hours; they must sell those kilowatt-hours at the right time. "We must have a load-factor consciousness in our selling."

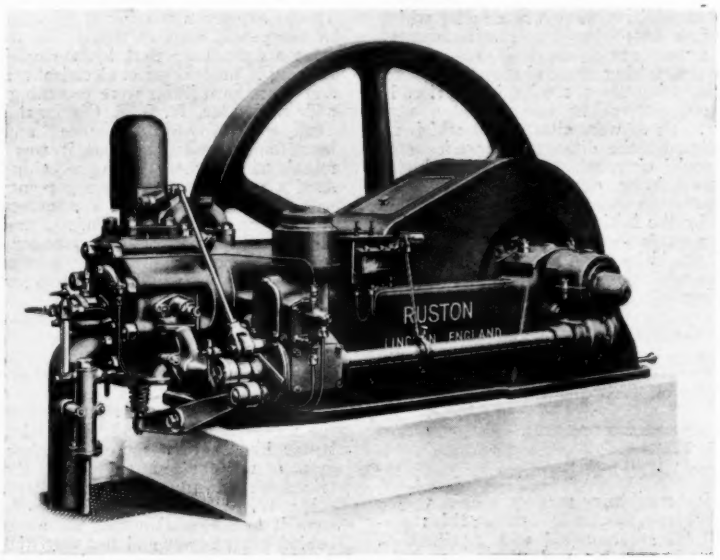
The planning of merchandising programmes formed the subject of an address by Mr. V. H. Moon, and the present state of public relations was treated by Mr. H. Reid, chairman of the section dealing with this matter.

In a final paper by Mr. J. F. Owens (a vice-president of the Association) the need for acquainting the public with the industry's achievements was once again put forward. In fact this seemed to be the principal "high light" of the Convention (as our American friends would say).

A New Oil Engine.

Particulars of the New Ruston & Hornsby type H.R. Equipment.

A RECENT development of Messrs. Ruston & Hornsby, Ltd., Lincoln, is the H.R. heavy-oil engine, for which great claims are made as to efficiency and reliability. It is of the horizontal type and is made in single-cylinder models in sizes from 10 to 66 b.h.p., and in double-cylinder models in sizes from 76 to 132 b.h.p. The engine is designed to run on low-grade fuel oils, and it will start instantly from cold. The fuel consumption is guaranteed at from 0.47 lb. per b.h.p.-hour in the smallest to 0.40 lb. per b.h.p.-hour in the larger sizes. The engine operates on the four-cycle principle. Other features of special interest are: precision governing; no high-pressure air needed for fuel injection; improved automatic lubrication; packingless fuel pump; simple operation. The engine can be converted to run on natural, town, or suction gas.



A Ruston & Hornsby H.R. Oil Engine.

The bedplate casting is of robust and pleasing design, embodying the cylinder jacket and the two main bearing pedestals. The cylinder head is cast separately to make possible the use of a special heat-resisting material and to ensure a sound casting. It is accurately machined to receive the liner, and is secured to the bedplate by long studs with easily accessible nuts. The renewable liner is made of special wear-resisting cast-iron, which is bored and machined to fit in the back end of the cylinder jacket. A feature of the engine is the ease with which a new liner may be fitted. Considerable research has been directed to the problem of finding the most suitable metal for the pistons, which are made from a mixture of cast-iron. The particular type of gudgeon pin adopted will carry with safety nearly twice the bearing pressure usually employed with a fixed pin.

All the crankshaft bearings are so accurately machined and divided that the maximum pressures are not taken at the joint between the upper and lower halves. Lubrication is by means of oiling rings which revolve in large oil wells. The crankshaft is a steel forging, and the connecting rod is made of high-grade forged steel, turned and polished. On all models fitted with a single flywheel the outer end of the crankshaft is supported by a ring-oiled outboard bearing and pedestal.

The spiral gears for the sideshaft have machine-cut teeth which are accurately formed to ensure silent running, and which are completely enclosed in an oil-bath. The mechanical lubricator is directly driven from the sideshaft, and it functions automatically at the starting or stopping of the engine.

All the valve gear is actuated directly from the sideshaft by wide-faced steel cams of special design which work with hardened rollers. Provision is made for readily adjusting clearances of the inlet and exhaust valves. The atomiser is simple, reliable and has no delicate or complicated parts, and is constructed to atomise the oil as it enters the combustion chamber. The fuel pump, which is driven through a lever by a cam on the sideshaft, is of the spill-valve type, and the actuating parts are entirely enclosed and run in lubricating oil. The governor is of the centrifugal type and is gear driven; it regulates evenly the quantity of fuel delivered to the engine in accordance with the load and in such a manner that there is an explosion at every power stroke. All flywheels are made in the company's foundry of a special mixture of cast-iron suitable for the purpose. For electric lighting engines a specially heavy flywheel is fitted to ensure steady running. Except for the three largest sizes all models are arranged for hand-starting, and suitable starting handles are provided. The two smallest models can be fitted with a hand-operated self-starter suitably arranged for charging an air receiver from the engine cylinder without the use of an air compressor. For the two largest sizes a mechanically-operated starting valve is adopted as standard.

One large fuel supply tank to hold sufficient heavy oil for eight hours working is supplied, but if required a small starting oil tank with special connections for starting when using low-grade viscous fuels in cold weather can be provided. Uniform distribution of the fuel on all double-cylinder engines is claimed by the employment of the "Ruston" patented fuel distributor, which has been designed to eliminate entirely the danger of one cylinder carrying less than its share of the load. This distributor consists of a reciprocating plunger having inlet and outlet ports, and it is positively operated from the camshaft by an eccentric.

A New Radio-apparatus Factory.

Notes on the progressive development of the manufacturing facilities of the "Ekco" organisation and impressions of a visit to the new factory in Essex.

THE anniversary of an historic date in the development of radio-telephony occurred last month. Just a decade ago Dame Nellie Melba's memorable concert was radiated from the Chelmsford experimental transmitting station of Marconi's Wireless Telegraph Co., Ltd., the occasion being virtually the birth of broadcast entertainment in Great Britain.

Fig. 1.—Front View of Works during Erection.

The select band of enthusiasts who adjusted their receivers to the 2,800-metre wavelength during the evening of June 15th, 1920, to hear that concert has grown wonderfully, and now includes some 3,117,000 registered licence holders. Few, indeed, of the great public services, in ten short years, attained to such dimensions and so completely justified the courage and breadth of vision of the few who correctly appraised its potentialities.

Not less romantic is the history of the manufacturing industry that has grown up round the service itself. As an example of rapid progress on a sound basis the business of Messrs. E. K. Cole, Ltd., is noteworthy, for it was commenced as late as 1925 by Mr. E. K. Cole and Mr. W. S. Verrells, who claim to have marketed one of the first battery eliminators devised to energise radio receivers directly from domestic electricity supply mains, and to have thus opened up a new line of manufacture for radio apparatus makers.

The first successful mains unit was produced in a room of a private house with a staff of three persons, the space available being only 50 sq. ft., and the following figures afford an idea of the consistent rate of expansion since then: the floor space occupied at the end of 1925-26 was 150 sq ft.; in 1926-27 it was 500 sq. ft.; in 1927-28 it was 1,000 sq. ft.; in 1928-29 it was 4,000 sq. ft.; in 1929-30 it is 15,000 sq. ft.; and in 1930-31 it will be 80,000 sq. ft., with an additional 9 acres of land available for extensions as and when needed. The company claims to be one of the largest independent all-British concerns in the British Isles devoted exclusively to the manufacture of radio products, and when its new factory at Southend, Essex, is completed it will be in a position to provide employment for an additional 800 people, thus raising the total number of employés on its pay roll to close on 2,000 and, incidentally, absorbing a material percentage of the unemployed in the municipal borough, representing national service of which any employer may be justly proud.

The accompanying illustrations, which were obtained some few weeks ago, indicate the type and size of the new single-storey factory, in its rural setting, which is to take the place of the premises at present occupied in Leigh-on-Sea and Southend town. It will have a productive floor area of some 80,000 sq. ft. under one roof and is being equipped on modern lines for mass production with the aid of moving assembly tables that will ensure an even progression of processes from the raw materials stores at one end to the finished stores at the other extreme. Two-storey administrative office accommodation is to be provided as foreground frontage to the factory, which is to be electrically-driven throughout and generally illuminated by means of Benjamin industrial-type fittings, while oil-fired heating (Robey boilers) and air-conditioning plant (Matthews and Yates fans) has been installed to maintain adequate duct ventilation.

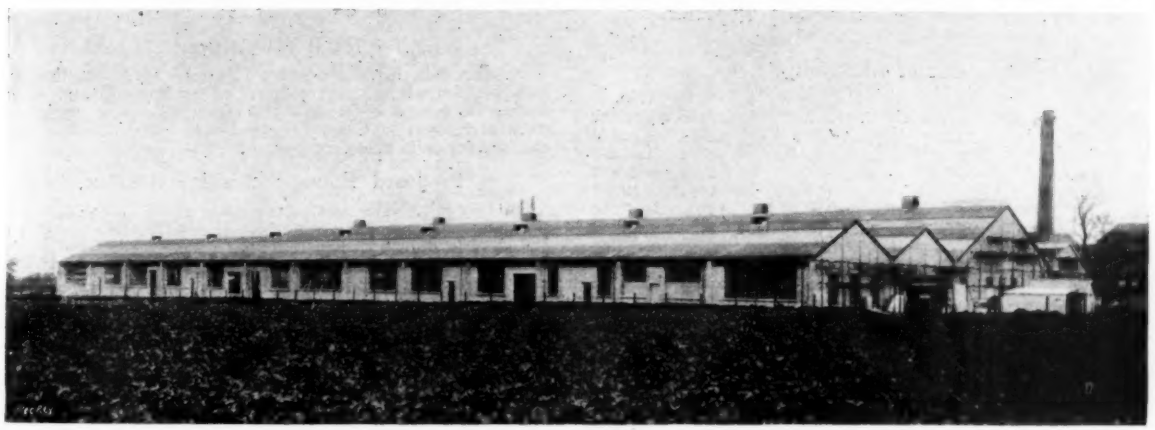


Fig. 2.—New "Ekco" Radio-apparatus Factory at Southend-on-Sea.

The justification for the capital expenditure represented by the new works is substantiated by the company's turnover, which we are given to understand has increased in value from £50 to £500,000 in five years. For instance, the turnover for the year 1928-29 was 2.5 times what it was in 1927-28 and in

Fig. 3.—An Interior View of Part of the New Factory.

1929-30 it has been 3.28 times larger than the 1928-29 figure, whilst during four months of 1930 the undermentioned increases were recorded: February 3.24, March 2.56, April 2.3, and May 3.0 times greater than in the corresponding months of 1929.

There can be no greater reward for the initial foresight and subsequent optimistic perseverance in marketing a needed article than that of which the above figures are evidence. Such success as they represent can only have been made possible of achievement with the assistance of an extensive sales organisation inspired with enthusiasm by its confidence in the possession of something trustworthy to sell. A wise policy of being content with the production of a few articles of merit rather than many of indifferent calibre restricted the company to the manufacture of battery eliminators, but in sufficient diversity of types and sizes to satisfy most a.c. and d.c. requirements, including filament accumulator trickle-charging. The latest additions to the range are mains units of standardised over-all dimensions for accommodation in the normal battery space of portable receiving sets, so converting them into mains-driven instruments when used indoors, but permitting the substitution of batteries when more legitimately employed portably. The a.c. models incorporate Westinghouse metal rectifiers and have variable voltage tappings. All types are enclosed in ventilated metal cases, are provided with earthing terminals, and comply generally with the safety recommendations of the Institution of Electrical Engineers.

More recently the company commenced to manufacture receiving sets of the 2-valve (detector and l.p. amplifier) and 3-valve (screen-grid h.f., detector, and power-output stages) types, both entirely mains operated. Of extreme compactness, they are neatly arranged in pleasing wood cabinets, the trustworthy performance of all "Ekco-Electric" apparatus rendering it worthy of front-page inclusion in every radio dealer's catalogue.

Parliamentary News.

[By Our Special Parliamentary Reporter.]

Gas or Electricity?

On July 8th, during the report stage of the Housing (No. 2) Bill, which embodies the Government's proposals for dealing with the slum clearance problem, Mr. WOMERSLEY moved a new clause providing that local authorities should not impose any term, condition, or restriction with respect to the form of light, heat, and power to be used in any house provided by them. He said that he moved the clause at the request of the National Gas Council. A peculiar position had arisen because certain local authorities which owned housing estates had stipulated that the tenants of the houses on those estates should only employ the medium which the local authorities nominated in order to give light, heat, and power to the houses. It was estimated that already there were something like 80,000 houses on which restrictions had been imposed. What was needed was fair competition between the two systems of providing heat, light and power. There was grave alarm among the working men engaged in the gas industry at this action on the part of the local authorities. The National Joint Industrial Council of the Gas Industry had passed a resolution urging the Minister of Health to prohibit local authorities from imposing such restrictions.

Mr. GREENWOOD, the Minister of Health, in resisting the proposal, said that behind the clause was the struggle between public and private enterprise. There had been no complaints from tenants about the matter; all the complaints had come from the private gas companies. It ill became the gas companies to talk about the liberty of the subject. In the nature of things the distribution of gas was a monopoly, and the local consumer had to take the gas company's gas, good or bad. About 1,500,000 houses had been built since the war, and if this restriction applied to only 80,000 houses, it showed there was really not much substance in the case. The clause really asked for a limitation of the freedom of local authorities. At present, with regard to 90 per cent. of the municipal houses built in this country, the usual form was to provide electricity for lighting and gas for heating and cooking. It was only in very isolated cases that the local authority insisted on the tenants consuming electricity for lighting purposes and did not allow them the use of gas.

Sir KINGSLEY WOOD, supporting the new clause, cited the case of Woolwich, where, he said, the local authority had erected a number of houses on its housing estate without making any provision for coal fires. Throughout the whole of the administration of its area it had definitely refused the tenants the right to have any kind of heating or lighting other than electricity. Many of the tenants had complained bitterly that they were not able to have the kind of heating they desired.

Capt. GUNSTON said he was keen on the installation of electrical appliances in working-class homes, because they saved a good deal of work, but electricity for cooking was not yet as cheap as they would like to see it.

Eventually the new clause was rejected by 254 votes to 164.

The Sevenoaks Special Order Opposed.

On July 10th, on the motion that the Special Order relating to Godstone, and for the amendment of the Sevenoaks and District Lighting Order, 1913, be approved, Mr. MUGGERIDGE (Labour) opposed the Order. He said that the company in question was described as the Sevenoaks & District Electricity Co., Ltd., but it was really a subsidiary of a very much larger concern—the County of London Electric Supply Company. Another company was also concerned. The power supply that was to be used in the districts covered by this Order came to the Sevenoaks company from the West Kent Electricity Company, which was another satellite of the County of London Company. All three probably got their pickings, and, by the time the consumers ultimately got electricity, the price was necessarily increased. He protested against granting the power proposed to this company. There was an alternative—the London & Home Counties Joint Electricity Authority—which was ready to supply the districts in question.

Other members supported this view, but Mr. MORRISON, the Minister of Transport, pointed out that there had been a public inquiry into the matter, and he had made judicial use of the powers conferred on him. The Joint Electricity Board had not even asked for an Order, let alone having been refused one. He was, however, willing to postpone the matter for a few days.

The matter was accordingly postponed, but the Order was brought up again on Monday last, and, after some further explanation, was agreed to.

Wireless Prosecutions.

On July 8th, Mr. LEES-SMITH, the Postmaster-General, informed Mr. Day that the number of prosecutions undertaken by the Post Office during the year ended May 31st, 1930, for the use of wireless receiving apparatus without a licence was 1,029. Convictions were obtained in 1,024 cases, the remaining five cases being dismissed for various reasons. The total amount of the fines and costs imposed by the Courts was £1,194. The Post Office expenses in connection with these prosecutions, less the sums awarded by the Courts as costs, were borne out of the Post Office share of the revenue from wireless licences. The fines were not received by the Post Office, but were paid over to the Exchequer.

Rural Telephones.

On July 8th, Mr. LEES-SMITH informed Mr. Day that the number of rural call offices provided in England and Wales during the year ended March 31st last was 3,694, of which 357 were at railway stations. The ordinary call office fees were charged for calls made from them.

Proposed Ealing-Southall Extension.

On July 8th, Major LLEWELLIN asked the Minister of Transport whether he had considered proposals for the extension of the electric railway from Ealing to Southall in order to give employment in the latter district; and whether he had taken any steps in the matter.

Mr. MORRISON said that no proposals of this nature had been considered by his Department, and any such scheme would be primarily a matter for the railway companies concerned.

Vibration of Transmission Line Conductors.

In a paper read before the I.E.E., Australia, Mr. E. Bate, electrical engineer to the State Electricity Commission of Victoria, deals with the danger of fracture of transmission line conductors due to vibration. The majority of failures have been of aluminium or aluminium steel-core reinforced conductors.

The trouble first appeared in Victoria on a 44-kV line, 120 miles long, with No. 1 B. & S. a.s.c.r. conductors and was obviated by re-sagging, which reduced the tension. Later similar trouble was experienced on an important 132-kV transmission line with 37/.1059 in. a.s.c.r. conductors (30 strands aluminium, seven steel), but it was impossible to adopt the same expedient. The States Commission had also under construction a 132-kV line with 37/.125 in. power conductors and a 19/.125 in. earth conductor, both having seven steel strands.

These lines were kept under observation, and it was found that heavy vibration occurred at low wind velocities (about three or four miles per hour). The most dangerous vibrations were characterised by strong beats in which the amplitude at the maximum was at least twice as great as that corresponding to uniform vibration at the same loop length.

With a view to overcoming the effect of vibration at suspension clamps a form of mechanical damper has been adopted. This damper consists of a piece of 29-ft. cable, similar to the line conductor and attached to it by eight clamps so as to be parallel with and below it at each suspension point. Four clamps are on each side of the suspension point, spaced at 4-ft. centres except those next the suspension point which are spaced 5 ft. apart. This damper is found to modify vibrations coming from the span by shunting them past the suspension clamp and reducing their effective loop length.

The Royal Agricultural Show.

A Review of the Electrical Features of the Exhibits at this year's Display at Manchester.

THE attendance at this year's show, which opened on July 8th, was disappointing, no doubt due to the depressed state of industry in Lancashire and Cheshire, and the Society might have been well advised to take this factor into account in fixing the charges of admission. Each year indicates progress in the development of agricultural implements by British firms, and there is probably good ground for the freely expressed opinion that Britain is now definitely ahead of the U.S.A. in this respect.

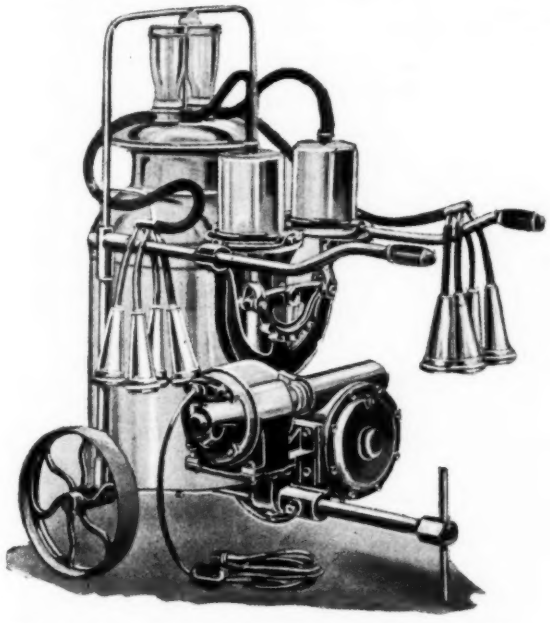


Fig. 1.—New Electrically-driven Milking Machine.

Compared with the Dominions, only the fringe of the possibilities have been touched in Great Britain, but the success which has attended electrical farming in Cheshire and elsewhere ought to be an encouragement to electricity supply authorities in developing this class of load.

The Electrical Development Association held a conference on the third day of the Show, and many farmers present listened with interest to a description of the rapid progress

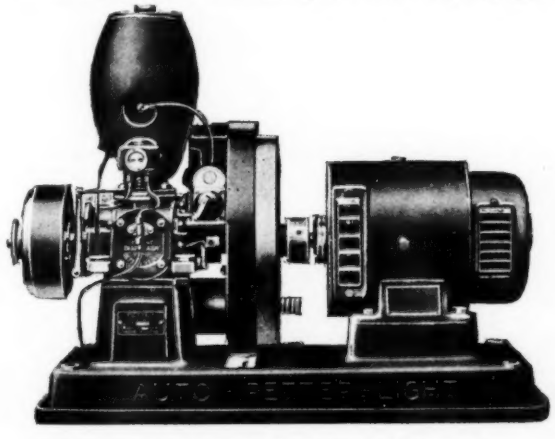


Fig. 3.—The " Auto-Petter " Lighting Set.

made with the utlisation of electricity for farming purposes in New Zealand. Mr. W. P. Gauvain, an electrical engineer in the service of the New Zealand Government, said that when first the New Zealand Power Boards started to work the majority of the farmers had no knowledge of electricity whatever; they were using oil engines for driving milking machines. Co-operation between the Power Boards and the farmers, however, led to a rapid scrapping of existing plants, and the substitution of electrical installations. The question of wayleaves, a great obstacle to progress in England, did not create

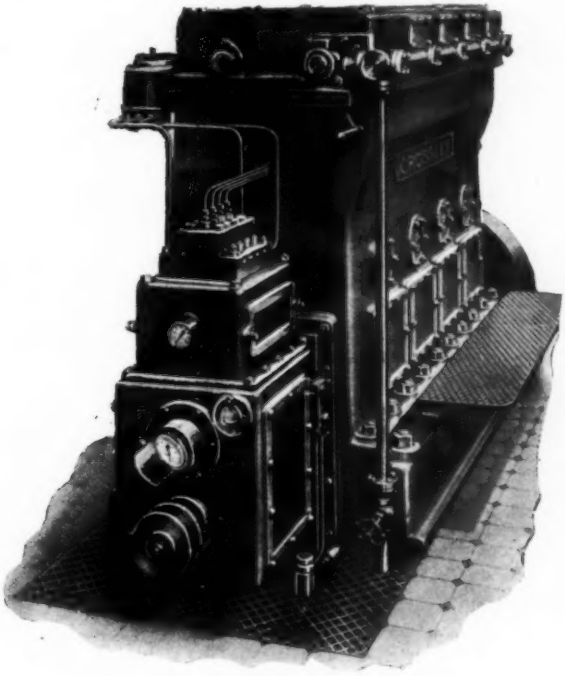


Fig. 2.—Crossley Diesel Engine.

difficulties there as it was realised that the value of the land was enhanced. There was competition to secure " electrified " land, and power was used for cream separating, milking, water pumping, sheep-shearing and general purposes. The farmers relied for their living on exports, and it was essential that production costs should be low to enable them to compete with other countries. The fact that they had gained an advantage by adopting electricity on a national scale was a recommendation which English farmers could not afford to ignore, especially as the latter were able to obtain their

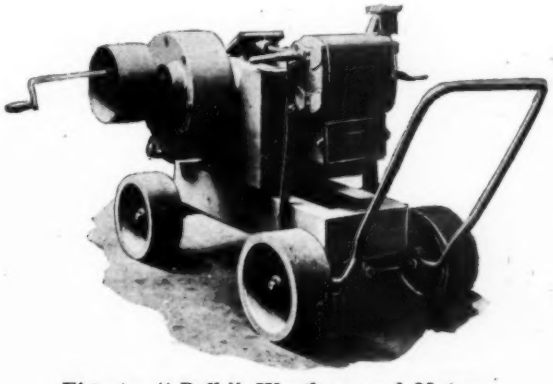


Fig. 4.—" Bull " Weather-proof Motor.

plant more cheaply than was the case in New Zealand. In the discussion which followed the financial aspect was prominently emphasised, and easy-payment schemes for the purchase of electrical equipment were advocated.

Electric milking machines were prominently featured at this year's Show and several important developments have taken place in this connection. The cleanliness of electricity for this purpose is a strong recommendation, and its use is likely to increase substantially. Perhaps the most interesting new milking machine was the new "Alfa-Laval" ½-h.p. magnetic milker, which has been introduced by the **Alfa-Laval Co., Ltd.**, and gained a Royal Agricultural Society's silver medal. The feature of this machine is that it substitutes electric central control in place of pneumatic control for the udder pulsators. A new "Hinman" electrically-driven milker with a rubber diaphragm attracted attention on the stand of **Associated Manufacturers Co., Ltd.**, while **A. Grabham & Co., Ltd.**, have brought out a new ¼-h.p. milker (fig. 1), which is exceedingly compact, the whole apparatus weighing 152 lb.

Once again the leading oil engine firms gave special prominence to lighting sets, and a number of interesting new models have been brought out in recent months. **R. A. Lister & Co., Ltd.**, Dursley, have introduced a range of fully automatic cold-starting high-speed Diesel lighting sets ranging from 2½ kW upwards. **Boulton & Paul, Ltd.**, Norwich, were showing a number of lighting-sets, including the "Electolite" 1-kW fully automatic set with starting battery. The **National Gas Engine Co., Ltd.**, of Ashton-under-Lyne, made a special feature of a new tube-starting horizontal oil engine and dynamo. The engine is of 116 h.p. (maximum) and is totally-enclosed. The most interesting feature to the electrical trade on the stand of **Ruston & Hornsby, Ltd.**, was a new airless injection cold-start Diesel oil engine, which is described more fully on another page in this issue. **Crossley Bros., Ltd.**, Manchester, have brought out a new 4-cylinder, 4-stroke, 110-b.h.p., 450-r.p.m. totally-enclosed compressorless Diesel engine (fig. 2). **Petters, Ltd., Yeovil.** were showing a new simplified type of lighting set comprising a 1½-b.h.p. petrol engine and a 950-watt generator (fig. 3).

The feature of the stand of the **Kohler Co., Ltd.**, was a new generator-set designed for emergency purposes. It is useful for anyone who is expecting to receive supply from the mains at an early date, and also for safeguarding essential supplies; in the event of a failure of the mains it will start up automatically.

As was the case last year, **Bull Motors, Ltd.**, were responsible for generators supplying power on the stands of **Agricultural and General Engineers, Ltd.**, their associated companies. The firm has brought out an exceedingly interesting new weather-proof, 3-phase, squirrel-cage, 5-b.h.p., totally-enclosed motor (fig. 4). The motor is normally fitted with three different gears and three different pulleys, so that it is enabled to run at 9 different speeds, each of the pulleys being interchangeable, and quite simply removed in a similar manner to a motor-car wheel.

Christy & Norris, Ltd., of Chelmsford, have introduced a new grinding machine which is used for the manufacture of exceedingly fine meal, such as chicken-food. It is fitted with a special electric motor supplied by **Crompton and Parkinson, Ltd.**

J. Harrison & Co. (Liverpool), Ltd., were showing a novel portable electric motor fitted to an adjustable tripod and capable of being applied to a very large number of different types of agricultural machines at short notice; it is made by the French **Etablissements Law**, while **Multifillers, Ltd.**, have introduced a new electrically driven bottle-filling machine. **Associated Manufacturers** were showing Wearn's automatic drive for driving all types of machines direct from high-speed electric motors; the main frame pivots or swings on the extension boss of the large gear, so that when power is applied to the pulley, the small pinion tends to climb the large gear, thus automatically tightening the belt to the load, and enabling a very short belt to be used. **Barford & Perkins, Ltd.**, of Peterborough, have introduced a new bottle-washing machine which washes 30 bottles per minute, both inside and out, and is claimed to fulfil the Board of Trade conditions; it is fitted with a 2-b.h.p. electric motor.

The **T. L. Smith Co.** has brought out a new electric combined bench mortising and wood boring machine. It is designed to serve several purposes in the small workshop and is usually fitted with a General Electric "Universal" motor.

B.S.S. for Desk-type Electric Fans.

The British Engineering Standards Association has issued a new specification, No. 380, for the performance of desk-type electric fans. This is a companion specification to No. 367, for ceiling fans, and it deals with the performance of the small-diameter high-speed propeller type of fan. The specification defines certain features of desk-type fans which relate to their performance, and gives tests by which the performance may be ascertained. Dielectric tests and limits of temperature-rise are also given. Copies of this specification can be obtained from the Association's Publication Department, 28, Victoria Street, London, S.W.1, price 2s. 2d, post free.

Correspondence.

Correspondents should forward their communications **as early as possible.** *No letter can be published unless we have the writer's name and address in our possession.*

Interference with Radio Reception.

The subject named has been one of much controversy, but I feel that the time has arrived when steps should be taken to enable the matter to be dealt with on the same lines and under the same statute as other nuisances. At the moment the position is as set out in a letter before me from "The Engineer-in-Chief" of the G.P.O.

"I am directed by the Postmaster-General to say that he has no statutory powers under which he could compel the owner of electrical plant causing interference with wireless reception to remove the cause of the interference."

Now I do not profess any legal knowledge, but, speaking as a layman, I must say this does seem to represent a remarkable state of affairs. I myself am particularly interested in the reception of programmes which, so far as I am aware, do not entail any expense on the part of our Post Office beyond the cost of issuing a licence; yet, having received the licence fee, the Post Office admits that it cannot take such steps to deal with interference as would enable me to receive that for which I have taken out a licence to receive. I am aware that a gun licence does not carry with it the provision of birds to shoot, but the two cases are not parallel. The matter could be argued under the heading of "causing a nuisance" because, should my neighbour install a petrol-electric plant, the exhaust from which caused annoyance, I could obtain an injunction to restrain him from continuing the annoyance, but in the case of a badly sparking commutator, which would prevent or interfere with wireless reception, I am powerless.

One could quote cases *ad lib.*, but my object in writing is not necessarily to start a controversy, but rather so that those interested in the matter can think out collectively or individually what steps may be taken to deal with the situation. Wireless reception has become part of our daily life and, sooner or later, there must be legislation to deal with such matters as needless interference. I believe it would help in the meantime if those interested would take the matter up direct with their Members of Parliament. This would at least help by indicating the feeling of the listening public and prepare the ground for such time as the case may be mentioned in the House.

James Nelson, M.I.E.E.

London, W.C.2, *July 14th*, 1930.

Handy Electrical Appliances.

Some time ago I built a house and decided to have it "all-electric." I now find I am being compelled to incur considerable expense and inconvenience in having gas installed, simply because I cannot obtain what I may call an "electric gas ring." I want some electrical "gadget" to boil an egg in under ten minutes, heat a pair of curling tongs, boil water —in short do the several little jobs a gas ring does.

I have tried several electrical shops, and also enquired at all electrical firms exhibiting at the recent North-East Coast Exhibition, including E.D.A., but the only firm which was interested stated that it hoped to bring out one shortly which would cost about £7 10s. An efficient gas ring can be purchased for 1s.

Can anybody help me to keep gas out of the house by suggesting something to answer my purpose?

Backtogas.

July 5th, 1930.

[Electric tongs are available and have the merit of cleanliness. A pint of water can be boiled by modern electrical methods in not much more than half the time mentioned by our correspondent.—EDS. ELEC. REV.]

Electrical Development: A Proposal.

Apropos of Mr. Ben Quarmby's recent article the following particulars of the Eltham Estate may be of interest:—

The estate is divided, one portion being brick built (all chimneys). Some of the concrete houses have chimneys, and a few are all-electric (with the exception of slow combustion stoves). The charge is through one meter for cooking, heating, and lighting, and there is a standing charge of 1s. 10d. per week which must be paid with the rent. Shilling in the slot meters are used and the secondary charge is ½ per kWh. Five per cent. discount was formerly given on all money collected through the meter but has now been abolished.

G. Corner.

Eltham, S.E., *July 11th*, 1930.

Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings taken.

1928.

37,441. "Electrical switchgear." Switchgear & Cowans, Ltd., and G. H. Neep. December 19th, 1928. (330,912)

1929.

4,298. "Band electric filters." Telefonaktiebolaget L. M. Ericsson. February 27th, 1928. (306,896.)

4,748. "Electric signalling systems." Soc. Technique d'Etudes et d'Entreprises pour l'Industrie and A. Huguenin. October 12th, 1928. (Addition to 305,166.) (330,914.)

5,362. "Sparking plug for internal-combustion engines." H. Heinrich and F. Kuhlmann. April 11th, 1928. (309,483.)

5,837. "Cathodes for electron-discharge devices." Dr. S. Loewe. February 22nd, 1928. (306,513.)

5,917. "Electric condensers." Elektricitäts Akt. Ges. Hydrawerk. February 22nd, 1928. (306,517.)

6,302. "Ignition equipment for motor cycles." British Thomson-Houston Co., Ltd., and C. J. Morton. February 26th, 1929. (330,780.)

7,501. "Variable-capacity electric condensers." A. Preen. March 7th, 1929. (330,877.)

7,948. "Electric cut-outs." W. E. Evans (Allgemeine Elektricitäts Ges.). March 11th, 1929. (330,954.)

8,294. "Telephone and signal system for fire-alarm, police, and ambulance calls, and the like." P. Doig. March 14th, 1929. (330,881.)

8,483. "Coupling of thermionic valves." W. A. Chambers and British Talking Pictures, Ltd. March 15th, 1929. (330,956.)

8,504. "Electrolyser with collecting block." J. E. Noeggerath. March 16th, 1928. (307,934.)

8,680. "Frame aerials." A. A. Price. March 18th, 1929. (330,899.)

8,700. "Switching devices for electrically-operated automatic delivery machines." C. Hänel. March 18th, 1929. (330,959.)

8,713. "High-frequency telephone systems." Associated Telephone and Telegraph Co. March 30th, 1928. (308,796.)

8,839. "Electric switches." T. W. Bennett and G. A. Eagles. March 19th, 1929. (330,937.)

9,017. "Ventilation of dynamo-electric machines." General Electric Co., Ltd., and R. Orsettich. March 20th, 1929. (330,967.)

9,031. "Protective arrangements for electric circuits." British Thomson-Houston Co., Ltd. March 20th, 1928. (308,276.)

9,039. "Protective arrangements for electric circuits employing gas-discharge tubes." Automatic Telephone Manufacturing Co., Ltd., and T. Blashill. March 20th, 1929. (330,942.)

9,042. "Submarine signalling cables." O. E. Buckley. March 20th, 1929. (330,944.)

9,067. "Control of electrical transformers employed for the supply of mercury-arc rectifiers." W. Weekes. March 20th, 1929. (Cognate application, 38,051/29.) (330,969.)

9,138. "Production and control of electric oscillations." H. J. Lucas. March 21st, 1929. (330,973.)

9,156. "Automatic synchronising of motor convertors." English Electric Co., Ltd., and J. C. Wilson. March 21st, 1929. (330,974.)

9,201. "Projector lamps and the like." Anciens Etablissements Sauter-Harle. April 17th, 1928. (309,908.)

9,255. "Electromagnetically-operated counters or meter mechanisms." Standard Telephones and Cables, Ltd., and M. S. Snell. March 22nd, 1929. (330,979.)

9,300. "Selector testing circuits." Telefonaktiebolaget L. M. Ericsson. March 24th, 1928. (308,609.)

9,352. "Electric rotary switches." British Thomson-Houston Co., Ltd., L. Griffiths, C. J. Morton, and T. H. Woodfield. March 22nd, 1929. (330,985.)

9,361. "Apparatus for capping and paraffining the carbon rods of electric dry batteries." Autom-Spezialmaschinen Ges. and E. Schmidt. March 22nd, 1929. (330,987.)

9,694. "Electric circuit breakers." A. Reyrolle & Co., Ltd., and A. Allan. March 26th, 1929. (330,946.)

10,012. "Magneto-electric machines." British Thomson-Houston Co., Ltd., F. A. Fossey, and J. H. Pollard. March 28th, 1929. (331,000.)

10,338. "Make-and-break devices for magneto-electric machines." British Thomson Houston Co., Ltd., and H. T. Warner. April 3rd, 1929. (331,002.)

10,874. "Thermionic valve circuits." Gramophone Co., Ltd., and A. Whitaker. April 8th, 1929. (331,007.)

10,964. "Electric switches." Johnson & Phillips, Ltd., W. J. P. Orton, and T. K. Cordes. April 9th, 1929. (331,009.)

11,202. "Reverse-current electromagnetic relays." Allmänna Svenska Elektriska Aktiebolaget. April 14th, 1928. (309,599.)

11,782. "High-frequency amplification by thermionic valves." F. Murphy and E. J. Power. April 16th, 1929 (331,014.)

12,468. "Thermionic valve arrangements." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). April 22nd, 1929. (331,022.)

13,102. "Protecting devices for electric insulators." J. W. Hofmann. April 27th, 1929. (331,029.)

14,002. "Automatic switch for controlling the starting and stopping of internal-combustion engine-driven electric generating plants." A. A. S. Rosco. May 6th, 1929. (331,035.)

14,407. "Measurement of the rate of flow of liquids by means of electric generators." L. Mellersh-Jackson (Siemens & Halske Akt. Ges.). May 8th, 1929. (331,040.)

14,428. "Radio apparatus." Universal and General Radio Co., Ltd., and L. M. Myers. May 8th, 1929. (331,041.)

14,540. "Incandescent cathode X-ray tubes." J. D. Frye and C. O. R. Andrews. May 9th, 1929. (331,043.)

14,809. "Electro-megaphones." S. G. Brown. May 11th, 1929. (331,047.)

14,907. "Electric insulators." Associated Electrical Industries, Ltd. May 11th, 1928. (311,658.)

15,225. "Electrically-maintained tuning forks." Etablissements E. Belin and F. Holweck. May 15th, 1928. (311,742.)

15,359. "Arrangement of laminated iron shells for current-carrying coils for induction furnaces." Almänna Svenska Elektriska Aktiebolaget. July 16th, 1928. (315,693.)

15,481. "X-ray tubes." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). May 17th, 1929. (331,052.)

15,945. "Means for dissipating the heat from electric lighting fittings." Benjamin Electric, Ltd., and H. T. Harrison. May 23rd, 1929. (331,055.)

16,018. "Multi-pole electrical switches." A. G. Clark and Plessey Co., Ltd. May 23rd, 1929. (331,057.)

16,343. "Electrically-heated bed-warmers and the like." A. K. Croad (Naamlooze Vennootschap Fabriek van Instrumenten en Elektrische Apparatem Inventum). May 27th, 1929. (331,062.)

16,615. "Diaphragm units for loud-speakers and the like." W. O. Lawler. May 30th, 1929. (331,064.)

16,926. "Contact device for electric circuit breakers." Allmänna Svenska Elektriska Aktiebolaget. June 23rd, 1928. (314,057.)

17,554. "Apparatus for Röntgen-ray investigation." Siemens-Reiniger-Veifa Ges. für Medizinische Technik. July 25th, 1928. (316,213.)

18,209. "Heavy-current contact for electric switches." Maschinenfabrik Oerlikon. June 27th, 1928. (314,429.)

18,268. "Means for protecting arrangements for repeatedly switching in automatic switches." Siemens-Schuckertwerke Akt. Ges. June 14th, 1928. (313,571.)

18,432. "Wave signalling system." Hazeltine Corporation. June 23rd, 1928. (314,070.)

18,454. "Electric time switches." Horstmann Gear Co., Ltd., A. Horstmann, and K. J. Horstmann. June 15th, 1929. (331,083.)

18,613. "Electric discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. July 16th, 1928. (315,699.)

18,786. "Vibratory diaphragms for loud-speakers and other instruments." H. Palethorpe and M. K. Foster. June 19th, 1929. (331,087.)

18,892. "Electrical transformers." Koch & Sterzel Akt. Ges. December 15th, 1928. (331,088.)

18,996. "Multiplex telegraphy." Marconi's Wireless Telegraph Co, Ltd. August 13th, 1928. (317,316.)

20,913. "Submarine cable." Felten & Guilleaume Carlswerk Akt. Ges. September 28th, 1928. (319,756.)

20,956. "Electrical contact pins." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. October 19th, 1928. (331,110.)

22,250. "Electro-optical systems, and apparatus therefor." Electric Research Products, Inc. July 24th, 1928. (316,185.)

22,506. "Electric lighters." W. Isch. July 22nd, 1929. (331,119.)

23,934. "Control of alternating currents, especially those of high frequency." C. Lorenz Akt. Ges. August 6th, 1928. (316,946.)

29,689. "Multi-phase circuit breakers." Felten & Guilleaume Carlswerk Akt. Ges. May 25th, 1929. (331,148.)

29,714. "Masts or posts for electric conductors." J. Maroni. October 1st, 1929. (331,149.)

34,329. "Starting of rotary synchronous phase transformers." Dr. K. Kando. November 13th, 1928. (331,173.)

1930.

4,204. "Seals for the contact leads of vacuum switches and the like." British Thomson-Houston Co., Ltd. March 23rd, 1928. (Divided application on 308,615.) (330,995.)

Maintenance of Transformer Water-cooling Coils.

Water-cooling coils in a transformer tank are subject to the three following evils: sludge collection on the outside, lime deposit inside, and leaks. Sludge formation on the coils will occur in course of time, and can be removed by brushing or scraping them each time the oil is drawn off. Internal deposits in the tubes are more troublesome, and all water contains some solids in solution which will, under the heat of working, be deposited in the tubes.

The presence of scale in the coils can be detected by measuring the water flow by a meter or diverting the water into a measuring tank; if the water flow is found to have diminished from the original rate, the coils are scaled. Another possible test is to take the water temperature at its entry to and exit from the cooling coils, the temperature difference being checked against that obtained when the coils were first installed. If the temperature difference has been found to have much increased with the same load on the transformer, the coils are clogged with deposit. The best way to remove this deposit is by means of a solution made up from equal parts of commercially pure hydrochloric acid and water. This solution should be circulated through the coils, when it will be found to eat into the deposit and carry it away in solution. The solution will be white as it leaves the cooler, but will become cleaner as the deposit is eaten away. The condition of the scale at the ends of the coil should be checked from time to time with a screwdriver and when found to be completely softened the acid treatment should be stopped. The coils should then be flushed out with a jet of high pressure water, which will be found to remove any loose deposit and any trace of acid. After cleaning, the coils should be tested for leaks. The best way to do this is to cap one end of the coil and connect to the other a supply of air at a pressure of about 100 lb. per sq. in.; a pressure gauge should be connected to the circuit and its reading kept under observation. If after six hours the pressure is found to have fallen, a leak exists. The position of the leak can be found by painting any suspected places with a lather of soap and water; bubbles in the lather will show where the leak exists. Leaks in these coils are fortunately extremely rare, but are liable to develop if the cooling water is bad or the coils have been damaged.

Each month the water should be drained off and the coils blown out by air at a pressure of at least 100 lb. per sq. in.; this will be found to remove any loose sediment.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

ARBROATH.—Offices and factory for Douglas Fraser & Sons, Ltd., engineers; the manager.

BARNET.—Houses (50), Boreham Wood, for the R.D.C.; A. J. Wilshire, surveyor, Boreham Road (returnable deposit of £2 2s.).

BIRKENHEAD.—Ward pavilion, infectious diseases hospital, for the T.C.; R. W. Johnston, borough engineer (returnable deposit of £2 2s.).

BURTON-ON-TRENT. — Extensions, isolation hospital (£13,997); T. Lowe & Sons, Ltd.

BURY (LANCS.).—Flats (220) for the T.C.; Leyland Construction Co., builders, Leyland.

CAERPHILLY.—Houses (50) for the U.D.C.; surveyor.

CANTERBURY.—Extensions, Simon Langton schools, with lighting and central heating (£7,300), for the governors; clerk.

CARLISLE.—Houses (100), Botherly estate; P. Dalton, 18, Fisher Street.

CHADDESDEN (DERBY).—Houses (300) for Browning, Ltd., Leicester.

CHELTENHAM.—Reconstruction scheme, Swindon Passage and Grove Street areas; borough engineer. Houses (70) for the T.C.; borough surveyor. Grammar school for Gloucestershire E.C.; director of education, Gloucester.

CHESTERFIELD.—Extensions, Royal Hospital, Holywell Street; governors.

CIRENCESTER.—Extensions, Memorial Hospital (£10,000); A. P. Dowglass, architect.

DEAL.—Houses (50) for Betteshanger Colliery Co.; G. Lewis and Sons, builders, Dover.

DERBYSHIRE.—Secondary school, Claycross, for Derbyshire E.C.; G. H. Widdows, education architect, Derby.

DORKING.—Municipal offices; U.D.C. surveyor.

DOUGLAS (I. OF M.).—Tenements, Bigwell site; Universal Housing Co., Ltd. (£31,875); W. McArd & Son (£13,250); and J. Cowle & Son (£4,644).

EASTBOURNE.—Aerodrome, Crumbles; borough engineer.

EAST KILBRIDE.—Extensions, with electrical work, Hairmyres colony, for Lanarkshire C.C.; P. C. Smith, architect, District Offices, Hamilton.

FALKIRK.—Bungalows (36) for Falkirk Building Society (£20,900); the secretary.

GLOUCESTER.—Aerodrome; Gloucester and Cheltenham Corporations.

HALIFAX.—Shops and offices, Bull Green, with electrical and heating work, and electric passenger lift, for the T.C.; A. C. Tipple, borough engineer (returnable deposit of £2 2s.).

HAMILTON.—Picture house, with electrical work, for the Scottish Cinema and Variety Theatres, Ltd., Glasgow; C. J. M'Nair, architect, Glasgow.

HANTS.—Two schools at Andover for Hants. E.C. (£17,310); director of education, Winchester.

HAYES (MIDDLESEX).—Houses (214) on Woodend Park estate; Unit Construction Co., Ltd. School, Botwell House; Rev. Father Diego. Houses (80) in Pump Lane and Mount Road; J. R. Scott, architect.

HEMEL HEMPSTEAD.—Extensions, isolation hospital; P. W. Prevett, architect.

HEREFORD.—Houses (150) at Hunderton for the T.C.; borough surveyor.

HERNE BAY.—Town hall and fire station for the U.D.C. (£17,000); surveyor.

HERTS.—Secondary school, St. Albans, and elementary schools, Buntingford, Baldock, and Sandon, for the E.C.; director of education, Hertford.

HITCHIN.—Houses (42) for the R.D.C.; A. E. Passingham, clerk (returnable deposit of £2 2s.).

HYDE.—Conversion of Theatre Royal to cinema; T. E. Smith & Sons, architects.

IRISH FREE STATE (DUNDALK, CO. LOUTH).—Houses (45) for the Urban District Council; Maurice Sellars, town surveyor, Town Hall.

KENT.—School, Sidcup, for the E.C.; W. H. Robinson, architect, Springfield, Maidstone (returnable deposit of £2 2s.).

LEEDS.—Extensions, Hope Hospital; Chorley, Gribbon and Foggitt, architects.

LIVERPOOL.—Public elementary school (520), North Hill Street; director of education, Education Offices, Sir Thomas Street. Reconstruction of King's Hall Kinema, Oakfield Road, Anfield (£50,000), for General Theatres Corporation; Gray & Evans, architects. Houses (545), Dovecot estate; director of housing, Municipal Buildings, Dale Street (deposit £1 1s.).

LONDON (FINCHLEY, N.).—Houses (82), Sandringham Avenue and Kenver Gardens; V. Smith.

(HAMPSTEAD, N.W.).—Extensions, London Temperance Hospital, Hampstead Road (£35,000); Claude W. Ferrier, architect.

(BERMONDSEY, S.E.).—Flats (112), Acorn site (£74,000); flats (44), Page's Walk (£23,270); Corporation Works Department.

(LEWISHAM, S.E.).—Cinema, Slaithwaite Road; J. Stanley Beard & Clare, architects.

(STREATHAM, S.W.).—Shops and flats, High Road and Greyhound Lane; F. Leonard Poole, architect. Premises for W. H. Smith & Sons, High Road; Romaine-Walker & Jenkins, architects.

(BLOOMSBURY, W.C.).—Nurses' home, Alexandra Hospital, Southampton Row; H. Edmund Mathews, architect.

(SOUTHFIELDS, S.W.).—Extensions to factory, Merton Road, for Starkey Gardner, Ltd.; W. Lawrence & Son, Ltd.

LYDNEY.—Houses (30) for the R.D.C.; surveyor.

MACCLESFIELD.—Houses (34) for the T.C.; Middleton and Co., Ltd., builders, Bank Street Sidings, Blackpool.

MAIDENHEAD.—Extensions, General Hospital (£17,000); Stanley Hall, architect.

MAIDSTONE.—Houses (185) on Mote site for T.C.; T. F. Bunting, borough surveyor.

MALTBY.—Houses (330) for the U.D.C.; M. R. Jones, surveyor.

MIDDLETON.—Houses, Marnway site; borough surveyor. Two schools for the borough E.C.; P. Howard and B. Widdows, architects.

MORTLAKE.—Extensions, isolation hospital, Barnes U.D.C.; surveyor.

NORTON (YORKS.).—Houses (50) for Major A. N. Braithwaite, M.P.

NOTTINGHAM.—Two central schools; Education Committee.

PAISLEY.—Houses (120) for Corporation; burgh surveyor. Shops and offices for Equitable Co-operative Society, Ltd., 16, Great Hamilton Street; the manager.

PRESTON.—Public offices for the R.D.C. (£11,500); M. Lutener, clerk.

SALFORD.—Masonic hall, Peel Park Crescent, for Salford Lodge (£18,000); J. Fearnley & Son, Eccles New Road, contractors.

SELSDON.—School (£27,824); A. Monk.

SOUTHEND-ON-SEA.—Houses (64) for the T.C.; borough engineer (returnable deposit of £2).

SOUTH SHIELDS.—High school for boys; G. R. Smith, architect.

SPILSBY (LINCS.).—Works, electrically equipped, for J. A. Badley & Sons, motor engineers.

STAFFORD.—Extensions, General Infirmary; Sir Aston Webb & Son, architects (returnable deposit of £2).

STOURBRIDGE.—Houses (172) for the T.C.; F. Woodward, borough surveyor (returnable deposit of £3 3s.).

THORNE.—Sewage disposal works, Stainforth, for R.D.C.; W. H. Radford & Sons, Albion Chambers, King Street, Nottingham (deposit £3 3s.).

WATFORD.—Baths, with electrical heating, for the T.C. (£33,000); borough engineer.

WEST HARTLEPOOL.—Houses (50); borough engineer.

WEST RIDING.—Schools, Holmesley and Askern, for E.C.; H. Wormald, County Hall.

WHITEFIELD.—Houses (100); P. A. Baines & Son, builders, Preston.

WORCESTERSHIRE.—School, Rubery, for E.C. (£17,695); A. H. Guest, Ltd., builders, Stourbridge.

YORK.—Houses (92), Burton Stone Lane estate; city architect.